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INDIA RUBBER WORLD

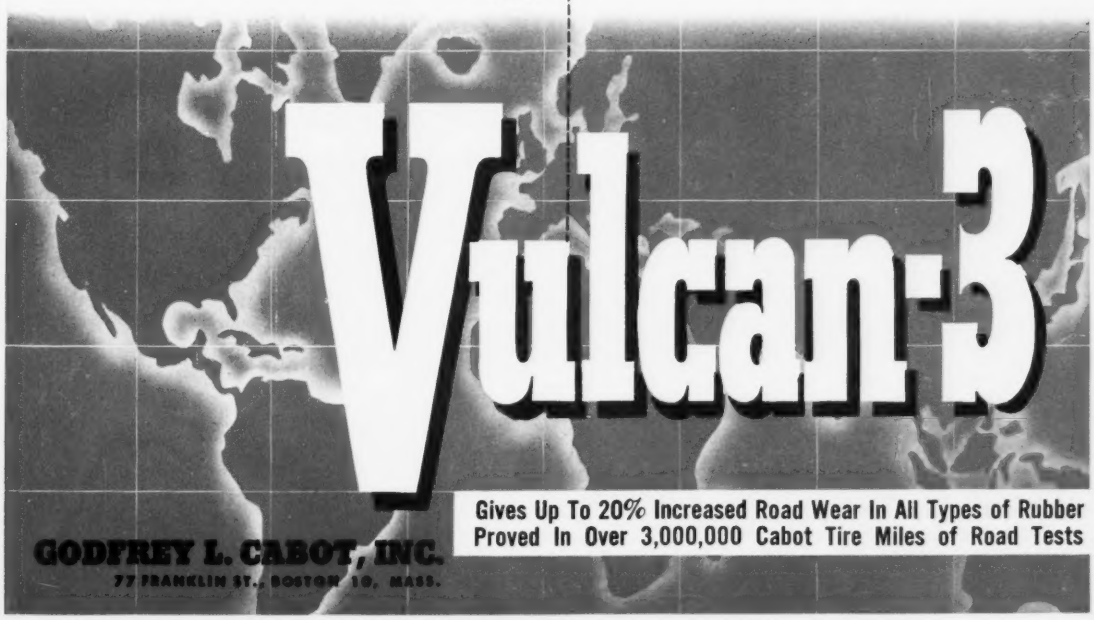
63rd YEAR

A BILL BROTHERS PUBLICATION

FEBRUARY, 1952

CABOT

Internationally Available High Abrasion Furnace Carbon Black Made from Oil



Gives Up To 20% Increased Road Wear In All Types of Rubber
Proved In Over 3,000,000 Cabot Tire Miles of Road Tests

GODFREY L. CABOT, INC.
77 FRANKLIN ST., BOSTON 10, MASS.

DU PONT ETHEX

(Zinc Diethyl Dithiocarbamate)

AN ALL-ROUND ACCELERATOR FOR LATEX

Ethex is an excellent general-purpose accelerator for use in all types of latex compounds. As a primary accelerator, Ethex will give you a rapid cure in dipped goods, including gloves, toys, balloons, and bladders. Castings and spread goods, too, benefit from the use of Ethex.

Used as a secondary accelerator, Ethex is an excellent activator for thiurams and thiazoles. In particular, combinations of Ethex and Zenite Special provide fast curing and impart good aging properties. Such combinations are of special interest in latex thread and latex foam compounds.

Ethex comes in the form of a fine, *non-dusting* powder. It is readily dispersible in water for easy addition to latex.

We'll be pleased to send you samples of Ethex for your evaluation. For further information, get in touch with your Du Pont representative or write: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

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DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

INDIA RUBBER WORLD, February, 1952, Vol. 125, No. 5. Published Monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Orange, Conn., under the act of

Another development using

B. F. Goodrich Chemical Company *raw materials*

These "O" Ring Seals made by Precision Rubber Products Corp., Dayton, Ohio. B. F. Goodrich Chemical Company supplies Hycar rubber only.

rubber "O" rings for tractors

FOR BETTER DESIGN, LONGER LIFE

REPLACING the special oil in a tractor hydraulic system can lead to trouble if any oil at hand is used—as often happens. For oil is tough on rubber—attacks the rubber sealing rings of the hydraulic system. Result—hydraulic system is less efficient and valuable time is often lost.

But now there's a new kind of "O" ring seal—a rubber "donut"—that is usable with almost *any* petroleum-based hydraulic fluid. It is made from a specially developed, extremely oil-resistant Hycar rubber compound that also has exceptionally good high and low temperature resistance. As many as 25 of these rubber "donuts" are used in some tractor hydraulic systems.

Here again Hycar demonstrates its versatility. For Hycar compounds can be made to resist oil, gas, many chemicals . . . heat and cold . . . weather, abrasion and more damaging conditions.

Hycar rubber may also be used as a synthetic resin modifier, a latex for coating or impregnating, an adhesive, and in many other applications. One of the many Hycar rubber compounds may be just what you need to improve or develop a product. Write for helpful technical bulletins or assistance. Please address Dept. HB-1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers
HARMON organic colors

Need high tensile strength? Hycar has it—plus abrasion resistance and more advantages.

Hycar
Reg. U.S. Pat. Off.
American Rubber

Philblack* O *stands stress plus heat*

For conveyor belts it can't be beat!

More truth than poetry in that one! For remarkable stress-strain properties, exceptional abrasion resistance, excellent flex life and good aging qualities . . . use Philblack O in your rubber compound. High conductivity . . . which minimizes buildup of dangerous static electricity . . . is another big plus for manufacturers of tire treads, conveyor belts, industrial hose and many other rubber products.

The Philblack Sales Service Laboratory is staffed and equipped to help with your rubber problems . . . ready to assist you in determining proper compounding procedures and recipes for optimum results in GR-S, low temperature polymers and natural rubber. Philblack O is shipped in bulk or bags. Firm, dense pellets handle efficiently in hopper cars and most bulk conveyor systems.

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PHILBLACK SALES DIVISION

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PHILBLACK EXPORT SALES DIVISION · 80 BROADWAY · NEW YORK 5, N. Y.

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Philblack A and Philblack O are manufactured at Borger, Texas. Warehouses in Akron, Boston, Chicago and Trenton.
West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

The Versatile *Thiurams*

MONEX — tetra methyl thiuram monosulfide
and
TUEX — tetra methyl thiuram disulfide

FOR USE IN GR-S
Butyl
Paracril
Natural Rubber

FAST CURING
SAFE PROCESSING
ECONOMICAL
PRIMARY ACCELERATORS

SECONDARY ACCELERATORS activating Thiazoles, Aldehydeamines, Guanidines

SUPERAGING STOCKS — **Monex** with low sulfur • **Tuex** with no sulfur

Both* Monex *and* Tuex *available as powder or as dustless, fast-dispersing NAUGETS®

PROCESS • ACCELERATE • PROTECT with NAUGATUCK CHEMICALS

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RUBBER & PLASTICS MACHINERY BULLETIN

Reporting News and Machine Design Developments

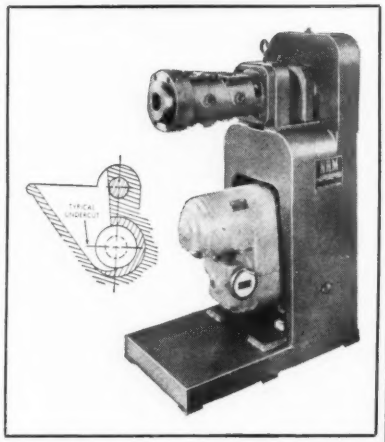
IN BUSINESS TO **NRM** REDUCE YOUR COSTS

New Extruder Occupies Minimum Floor Space

Newest addition to NRM's line of rubber extruders is the compact 1½" Standard Model. Specifically designed for experimental work, and well adapted to the production of small cross-section extrusions, the new machine occupies a floor space of only 4 square feet. Thus, it is ideal for use in the laboratory or in crowded production areas.

In addition to its compactness, the new extruder incorporates all of the outstanding features of the larger NRM machines. One of the most important of these is the undercut feed hopper (see sketch) which assures good hand feeding, or continuous strip feeding. With the under cut, the strip is not pinched off and a small bank of stock is maintained in the upper forward corner of the feed box. As a result, voids do not occur in the screw flights, the cylinder is evenly stuffed, and more uniform extrusions are obtained.

Other features of the new machine include: a heat-treated, hollow bored alloy steel, single flight, double tipped screw; semi-steel cylinder with replaceable Xaloy liner and circulating type jackets; jacketed die adapter head; extra heavy bearing housing with oversize bearings; 3 H.P. Variable Speed Drive; and, NRM's fine workmanship throughout.



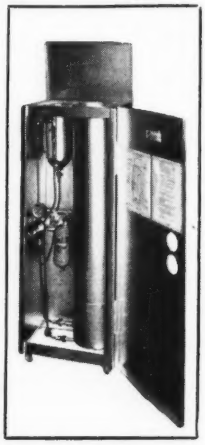
Write for more details!

Eastern Office Recently Opened

In order to provide better service to its Eastern customers, NRM recently opened a new sales office in the Raymond Commerce Building, Newark, New Jersey, Telephone: Mitchell 2-1849.

Managing the new office is Mr. E. R. Coddington, formerly of our Akron office, who has wide experience in rubber and plastics machinery. He will be happy to work with you on your processing problems.

NRM Now Handles Randall Duster In Midwest



The Randall Duster is an unique, automatic dusting machine that is highly efficient, compact, portable, and simple to operate. Using clean, bone-dry air at extremely low pressures as the vehicle, the Randall Duster deposits powder particles, ranging in size from 70 mesh to micropulverized, separately and uniformly on the object being dusted. Because of the low pressures involved, only the correct amount of dust is deposited. Stray floating of powder is held to a minimum so that no recovery system is needed.

Simple in design, the Randall Duster has only one operating control, a pressure regulator which starts and stops the flow of powder and controls the density of deposit. The entering air is first cleaned and dried and then passed into the powder reservoir. Here, the powder is thoroughly aerated, or "fluidized", and sent through a venturimixer into a low pressure air stream. Then, the powder-laden air is brought to the point of application by flexible hose and deposited as a "dry fog".

The Randall Duster can be used in the processing of numerous rubber and plastic items to eliminate tack, blocking or sticking, or to impart desired slip and "hand". The machine is available in three sizes to handle dusting applications ranging from a few ounces up to 200 lbs. per hour.

Why not write for further information? Ask about a free demonstration.

NEW TUBE VULCANIZER HAS SIMPLIFIED DESIGN

By combining a simplified design with the latest in fabrication methods, NRM now offers a fully automatic tube vulcanizer (Model 45-14-110) of the highest quality at low initial cost. A standard geared head motor drive, minimum maintenance and ease of servicing are additional features.

The new unit is designed for 110,000 lb. loading and has capacity for molds of 45" OD and 14" overall thickness. Fine adjustments for mold thickness are made through a pinion and gear driving a nut over an adjusting screw on the center line of the mold platen.

A safety bar, which is readily hinged out of position for convenience in making mold changes is also provided.

Total weight of the press, less mold, is 3700 lbs. Overall dimensions are 4' wide, 5'2" deep, 7' high, when open.

Write, today, for further information!

NATIONAL RUBBER MACHINERY CO.

General Offices & Engineering Laboratories
Akron 8, Ohio

East: 1180 Raymond Blvd., Newark, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Cal.
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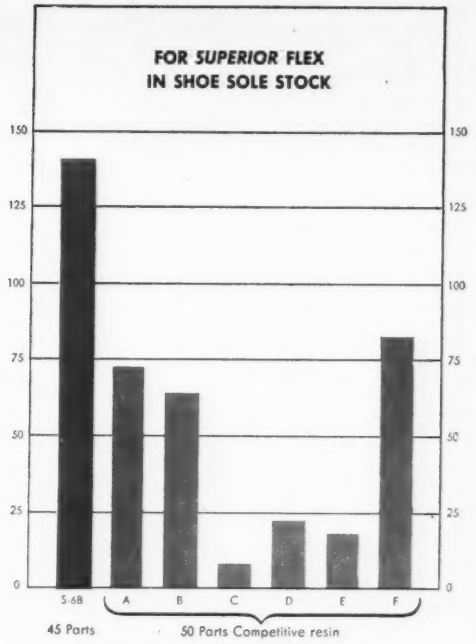
Creative Engineering

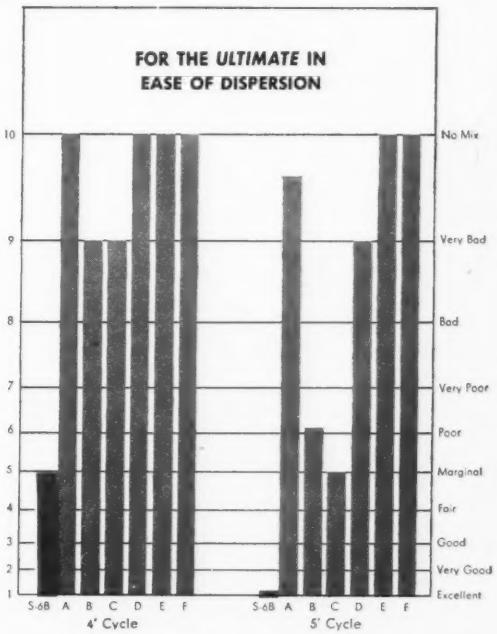
known as the best

PLIOLITE S-6B



Ross Flex of PLIOLITE S-6B vs. competitive resins in shoe sole stock; thousands of flexes/0.1" cut growth

USE PROVED Products



Dispersion rating of PLIOLITE S-6B vs. competitive resins in a gum formulation 50/100 resin/rubber

Here are two reasons why PLIOLITE S-6B is "The Best Known—Known as the Best" reinforcing resin on the market. Shoe soles reinforced with PLIOLITE S-6B are known to have superior flex. And whatever the product PLIOLITE S-6B is easier to disperse—even under marginal mixing conditions.

Check these two graphs—prove to yourself—then talk over your reinforcing problem with your Goodyear Chemical Division representative, or write today to:

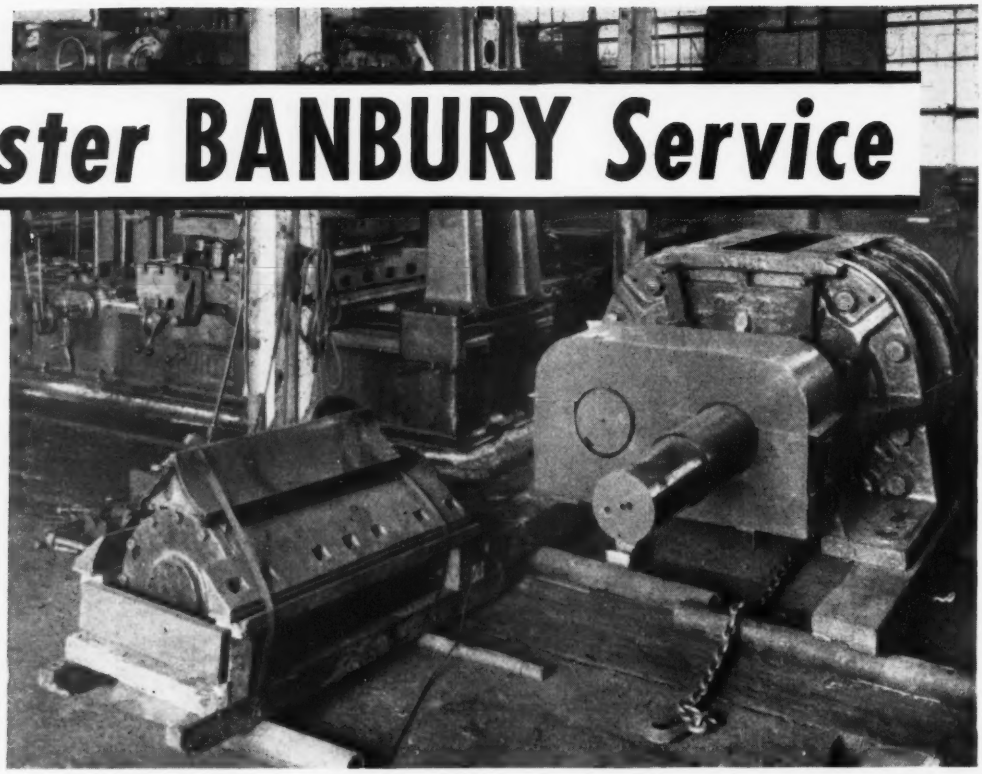
Goodyear, Chemical Division, Akron 16, Ohio

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Faster BANBURY Service



Saves MORE Production Time

Interstate Banbury Rebuilding Service enables you to replace any worn Banbury FASTER. Two options are available.

You can INTERCHANGE your old mixer body for one of ours, already completely rebuilt —

You can use our "Pre-Plan" method to have your present body rebuilt and returned to you.

We have many spare parts for Banburys.

Either way, YOU SAVE weeks of valuable production time. On Interchanges, extra fast service can be given right now on sizes number 9, 10-W, and 11.

Write or wire us for a reservation. Entrust your valuable Banbury mixer body only to qualified veterans and specialists in Banbury rebuilding. Interstate Service has been perfected through more than sixteen years of experience. Our facilities handle every size and type of Banbury, and each job is guaranteed. Estimates gladly furnished.

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EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

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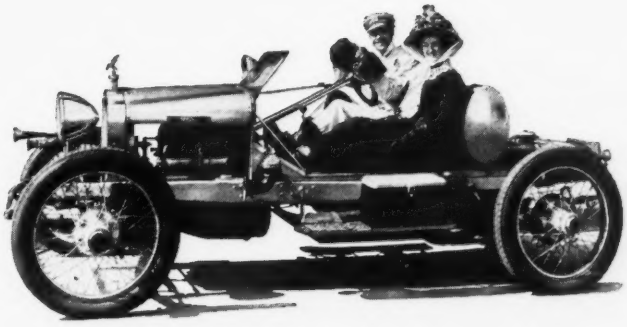


Since the time automobiles looked like this

Muehlstein has maintained—as it does today—a leading position in serving the rubber and allied industries.

H. MUEHLSTEIN & CO. INC.

60 EAST 42nd STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: Akron • Chicago • Boston • Los Angeles • Memphis

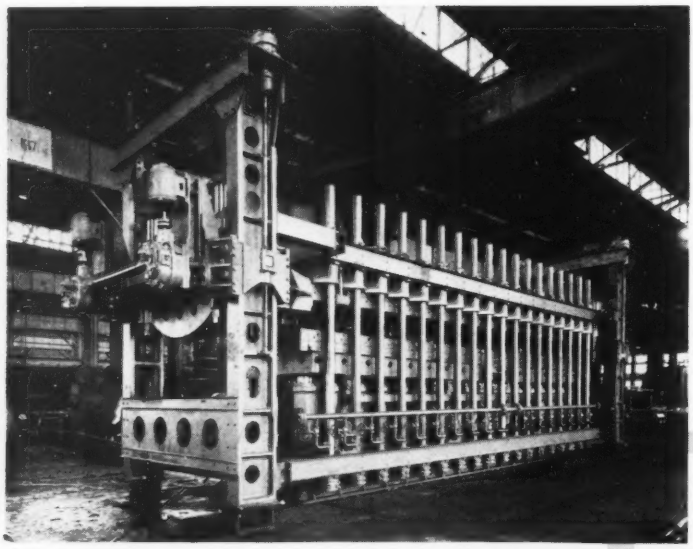
WAREHOUSES: Akron • Chicago • Boston • Los Angeles • Jersey City

CRUDE RUBBER · SYNTHETIC RUBBER · SCRAP RUBBER · HARD RUBBER DUST · PLASTIC SCRAP

The world's LARGEST

PRODUCED BY

ON A

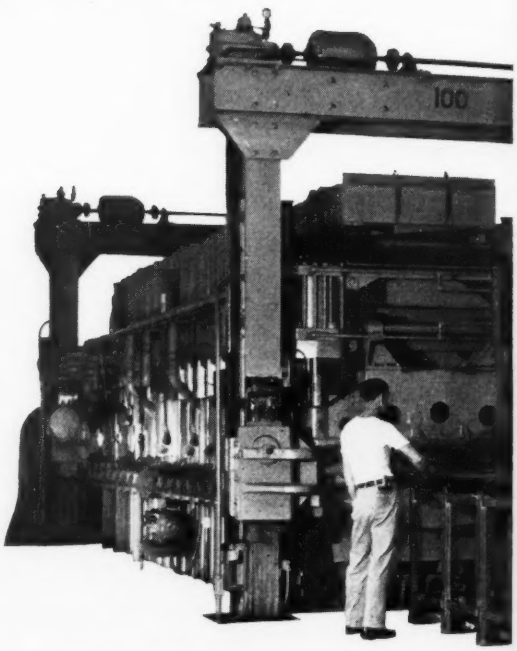


Shop view of Baldwin belt press. Moving platen weighs 38 tons. Unusual feature is temperature control; temperature variation is less than $\pm 3^{\circ}$ over entire platen area, assuring uniform curing.

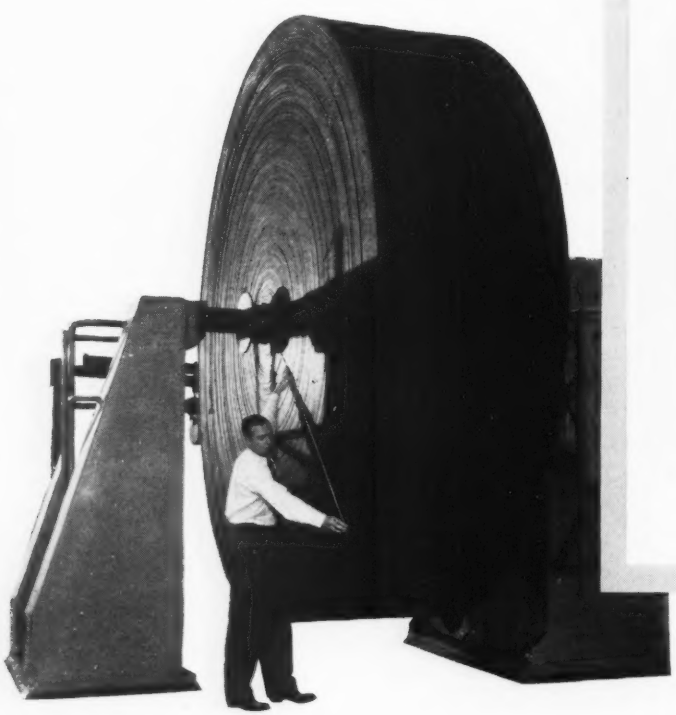
Conveyor belts have become a vital link in the Nation's industrial transport system . . . and B. F. Goodrich has been a pioneer in extending their use by making the belting ever bigger and better.

This has called for continuing developments in the size and performance of

World's largest single roll of conveyor belting during production on a Baldwin press in the B. F. Goodrich Company plant at Akron, Ohio.



The world's largest single roll of belting 15 feet in diameter, ready for crating and shipping on a special railroad car. Belt is 48-inches wide, and weighs 45,000 pounds.



EDDYSTONE DIVISION
BALDWIN-LIMA-HAMILTON CORP.
Philadelphia 42, Penna.
Offices in Principal Cities

BALDWIN

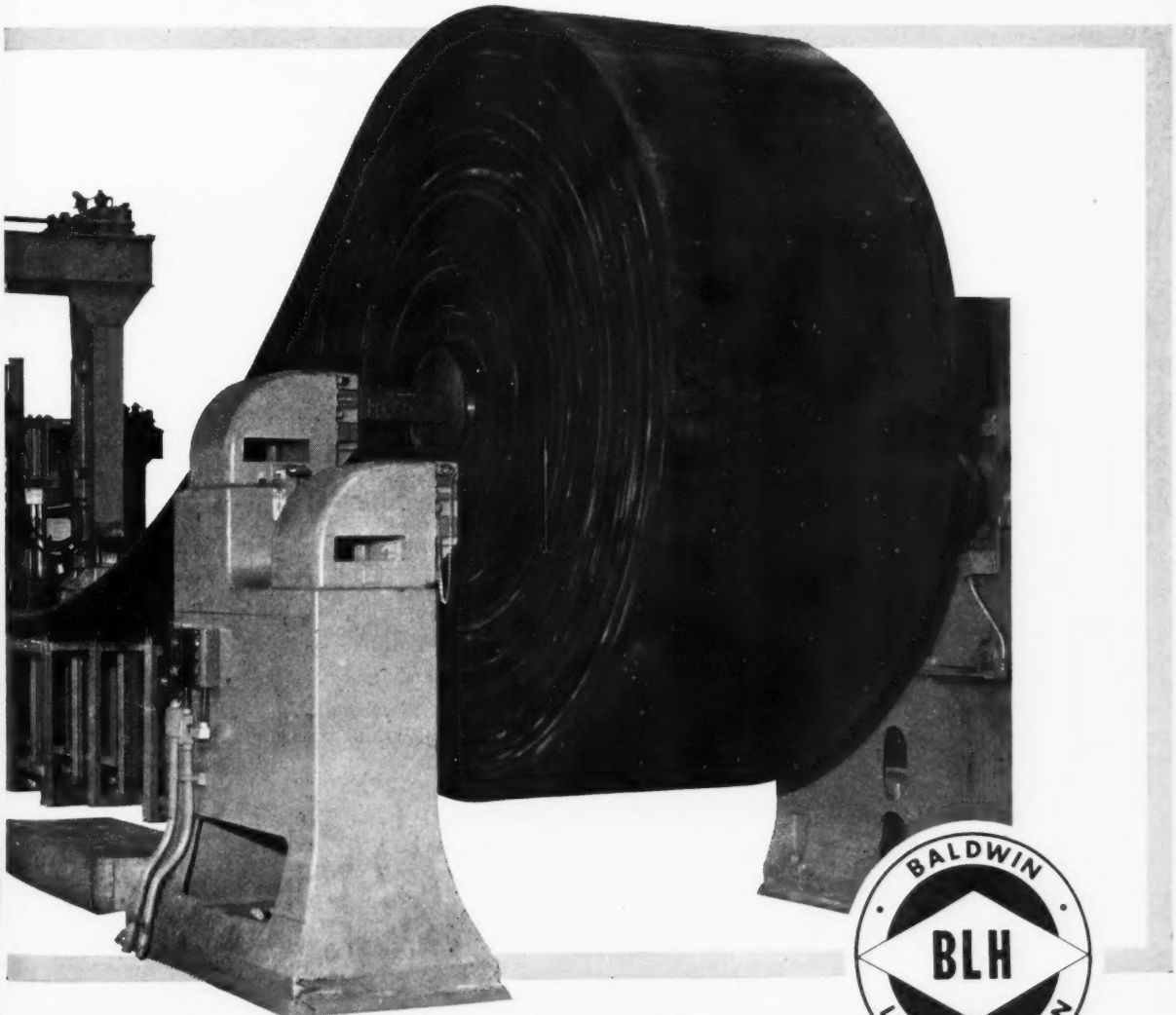
single roll of conveyor belting

B. F. GOODRICH COMPANY

BALDWIN PRESS

belting presses—which is where Baldwin comes in. The experience of years in designing and producing all varieties of presses for the rubber industry played a vital part in converting the designer's plans into a practical, high-production, precision machine. Platen surface is 76″ x 433½″, and a 36-foot section of belting, up to 72-inches wide, can be cured at one time.

The broad know-how of Baldwin-Lima-Hamilton is at your service at all times, for the construction, or development and construction, of all types of standard and special-purpose equipment. A representative will be glad to talk over your problem, and recommend a B-L-H press to solve it.



BALDWIN · BLH · LIMA-HAMILTON

-LIMA-HAMILTON

Sure cure for the "shakes"

UNDER the terrific vibration of aircraft engines, screws and nuts have a tendency to become loose. That's why Army, Navy and Air Corps specifications call for safety wiring on engine mountings, instruments, gun sights, magnetos . . . *every* place on a plane where a screw or nut might shake loose.

By simply drawing the lock wire through a small hole in each nut or screw, and then twisting tightly with pliers, a positive sure cure for the "shakes" is provided.

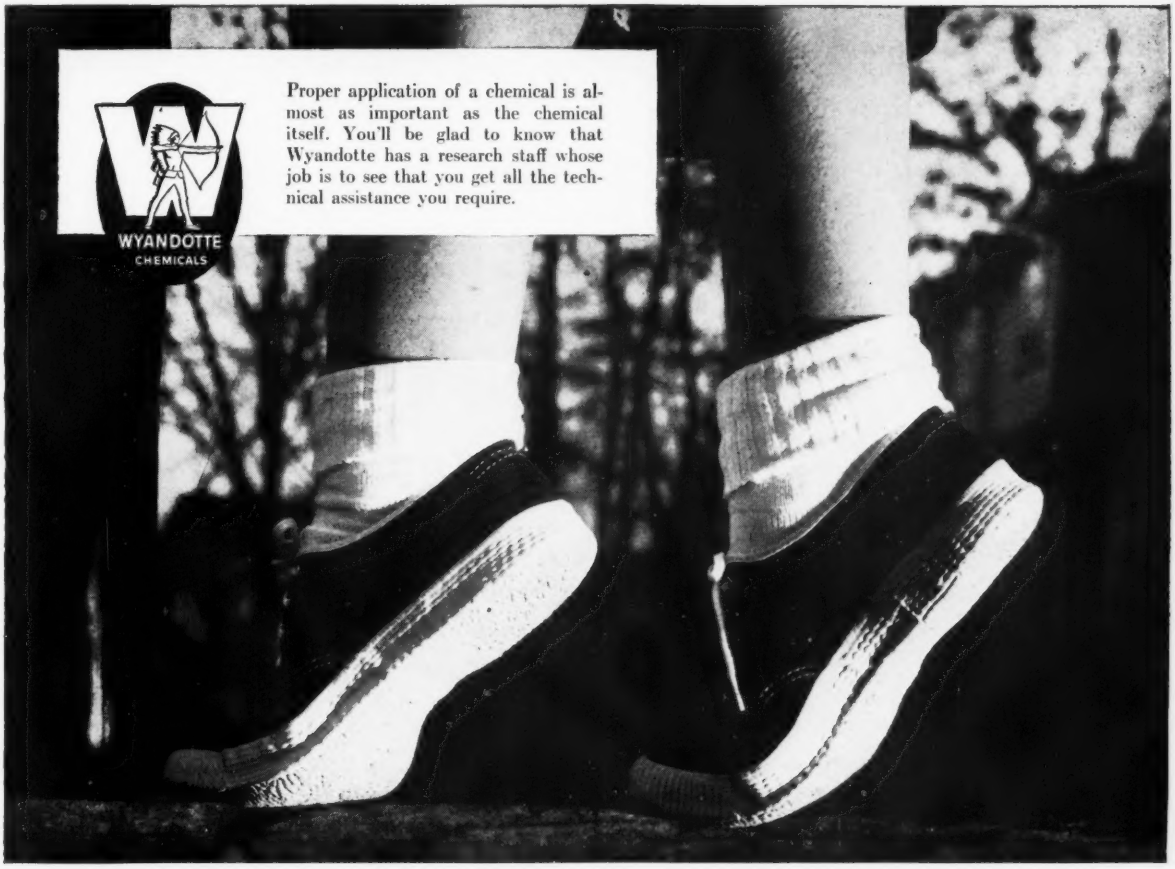
Wire for this important function must be highly resistant to corrosion, tough enough to resist fracturing under the heat and vibration of aircraft engines, and soft enough to twist with pliers for quick assembly and replacement of parts. Here at National-Standard we've developed a type of slow-annealed stainless steel wire to fully meet these exacting requirements. And we're drawing millions of feet of this wire, not only for aircraft but also for many other automotive applications.

Developing special wire for special purposes has been an important part of National-Standard's business for more than 45 years. Perhaps our unique engineering and manufacturing facilities can help you with your wire and wire fabricating problems.

NS
NATIONAL-STANDARD Company
NILES, MICHIGAN

DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL..*Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD..*Niles, Mich.*	Tire Wire, Stainless, Fabricated Braids and Tape
REYNOLDS WIRE..*Dixon, Illinois*	Industrial Wire Cloth
WAGNER LITHO MACHINERY..*Jersey City, N. J.*	Lithographing and Special Machinery
WORCESTER WIRE WORKS..*Worcester, Mass.*	Round and Shaped Steel Wire, Small Sizes


WYANDOTTE
CHEMICALS
Proper application of a chemical is almost as important as the chemical itself. You'll be glad to know that Wyandotte has a research staff whose job is to see that you get all the technical assistance you require.

Shoes courtesy Converse Rubber Company, Malden, Massachusetts.

Soles grip better, wear longer!
Can YOU use PURECAL T profitably?

Treat Wyandotte PURECAL*T exactly as you would a carbon black, and get these improved properties:

Kids give shoes an awful beating. "Cowboys-and-Indians" can grind shoes on hard concrete, test them on slippery roofs, tear them on sharp rocks.

The Problem: A manufacturer wanted to build more safety, tear-resistance, and wear into rubber soles.

The Solution: *Reformulation, using Wyandotte Purecal T, an ultrafine reinforcing filler — not as an ordinary calcium carbonate, but exactly as they had been using carbon black.*

The Results: Soles with extreme flexibility; good grip on slippery, dangerous surfaces; and unusually long life.

If you use a GR-S; some other synthetic elastomer with poor pure-gum properties; or natural rubber . . . *you* can enjoy these improved properties, PLUS these production advantages:

Purecal T gives you building tack in an all GR-S stock . . . it promotes knitting.

Purecal T lessens "nerve," makes smoother stocks, extends GR-S.

Purecal T has high abrasion resistance for a calcium carbonate . . . approaches that of the best clays.

Purecal T is snow-white . . . non-discoloring.

Purecal T is one of Wyandotte's family of precipitated calcium carbonates. Do you have any production problems that Purecals might improve or that our technical service may help you with? Write to *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in Principal Cities.*

*Trademark

Wyandotte CHEMICALS

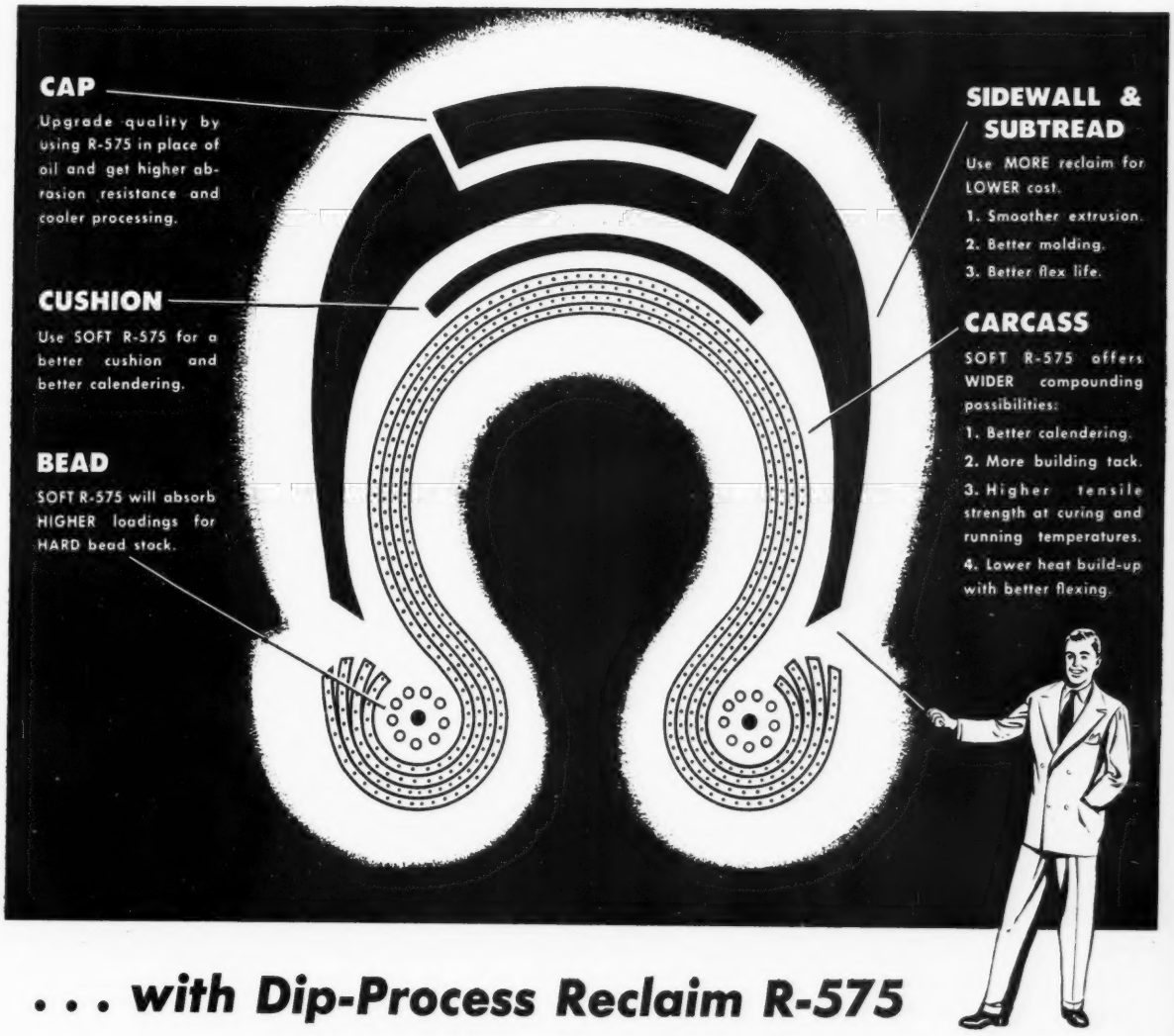
ST. JOE *lead-free* ZINC OXIDES

a Grade for Every Purpose

Our unique electrothermic smelting method, the latest improvement in the production of zinc oxide by the American Process, ensures the uniformity of these St. Joe pigments because of the close control exercised at the most critical point — *the instant of oxidation.* This control applies to both chemical composition and particle size, and is largely responsible for the preference accorded our products by a steadily increasing number of zinc oxide consumers.

ST. JOSEPH LEAD COMPANY
250 PARK AVENUE, NEW YORK 17, N Y
Plant & Laboratory: Josephtown, Beaver County, Pa.

Make a BETTER low-priced tire


CAP
Upgrade quality by using R-575 in place of oil and get higher abrasion resistance and cooler processing.
CUSHION
Use SOFT R-575 for a better cushion and better calendering.
BEAD
SOFT R-575 will absorb HIGHER loadings for HARD bead stock.
SIDEWALL & SUBTREAD
Use MORE reclaim for LOWER cost.
1. Smoother extrusion.
2. Better molding.
3. Better flex life.
CARCASS
SOFT R-575 offers WIDER compounding possibilities:
1. Better calendering.
2. More building tack.
3. Higher tensile strength at curing and running temperatures.
4. Lower heat build-up with better flexing.

. . . with Dip-Process Reclaim R-575

Now that the production of more than one line of tire is permissable, you can use MORE R-575 to produce a *far better* low-priced tire. As illustrated in the chart above, this versatile reclaim can be used to good advantage in every part of these tires. Plus all these advantages, you'll find that R-575 gives you faster and cooler mixing and larger Banbury batches with lower consumption of power.

In addition, you can use this SOFT R-575 Reclaim in all grades of Camelback that are now in such demand. You'll not only get less nerve but faster and smoother extrusion as well. We'd like the opportunity to tell you about the many advantages that our exclusive Dip-Process Reclaims can bring to your operation. Drop us a line now for complete details.

Always keep reclaims in your formula and always look to U. S. for the best. U. S. Rubber Reclaiming Company, Inc., P. O. Box 365, Buffalo 5, N. Y. Trenton agent: H. M. Royal, Inc., 689 Pennington Ave., Trenton, N. J.

69 yeas serving the industry solely as reclaimers

U.S. RUBBER RECLAIMING COMPANY, INC.

NEW!

SUBLAC PX-5 (Powdered Resin)

speeds processing, improves physicals of GR-S and natural rubber sole stocks!

- eliminates need for zinc oxide and accelerators in using basic fillers (Silene, etc.)
- oil resistant, light colored
- reaches optimum cure in 10 min. at 325° F.

TYPICAL TEST FORMULATIONS

	Formula #83	Formula #84
GRS (X631)	100	100
Sulphur	3	3
Silene EF	75	75
Neozone D	1	1
SUBLAC PX-5	30	30
Polymel C-130 Resin	–	5

NOTE—no zinc oxide or accelerators in these compounds

...AND TEST RESULTS

10 Min. Cure at 325° F.

Tensile psi	1200	1200
Elongation %	250	280
Modulus @ 200%	990	850
Hardness	81	83

ALSO PREVENTS SCORCH IN NEOPRENE!

10 parts of Sublac PX-5 on the rubber acts as a co-accelerator in all non-black neoprene stocks and prevents scorch in both process and bin storage stocks.

Sublac PX-5 also gives a preservative quality to unvulcanized neoprene stocks.

TEST SUBLAC PX-5 YOURSELF, FREE!

Write today for 5 lb. sample and test data. Once you've tried Sublac PX-5 in your own stock, you'll agree it's the biggest development yet in modern rubber processing.

REPRESENTATIVES:
EASTERN: H. M. ROYAL, INC., TRENTON, N. J.
WESTERN: MERIT-WESTERN CO., LOS ANGELES, CALIF.

ALSO ASK ABOUT THESE QUALITY POLYMEL PRODUCTS:

GILSOWAX (solid) — Extender, Wire Compounds
SUBLAC RESINS (powders) — Hardeners, Stiffeners
POLYMEL 6 (solid) — Tires, Camelback
POLYMEL 7 (liquid) — Tires, Camelback, Carcass
POLYMEL D (solid) — Polystyrene-Indene Plasticizer
POLYMEL C-130 (solid) — Plasticizer
D-TAC (solid) — Non-coloring Detackifier

THE POLYMEL CORP.

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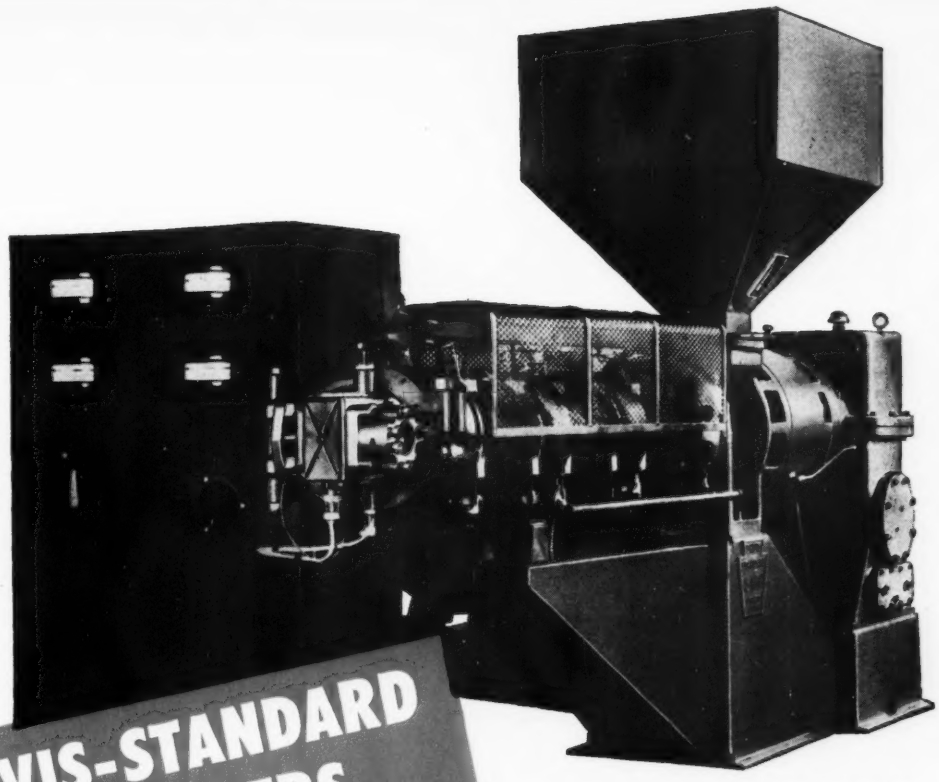
Baltimore 30, Maryland
Phone PLaza 1240



Davis-Standard 6"
Thermoplastic Extruder

DAVIS-STANDARD EXTRUDERS

...ENGINEERED TO YOUR OPERATING NEEDS

Every feature of our extruders for rubber or plastics is the result of long experience in the extrusion industries and intimate knowledge of production problems.

Davis-Standard "Stream-Flo" insulating heads permit the most efficient operating velocities. All head equipment is compact, accessible and easy to clean. For thermoplastic applications, sectional-type cast steel cylinders afford precise temperature control as well as maintenance advantages. Each section has wear and corrosion-resistant liners.

Another exclusive feature of Davis-Standard plastic extruders is the "Therma-Fin"* heating jacket, with range-type tubular heating elements and stainless steel cooling coils cast into aluminum cooling fins.

*Patent Pending

With this construction any desired temperature condition may be obtained.

Feed section is a separate casting. Stock screws are of special steel alloy, normally bored for water cooling. Variations for depth and lead are available for different compounds. Drive is V-belt or flexible coupling to enclosed worm reduction gear. Davis-Standard machines are furnished complete, including control panel, ready for installation.

Our engineers will welcome the opportunity to work with your engineers on your problems. Our extensive experience in custom-built equipment will fit the installation to your exact requirements.

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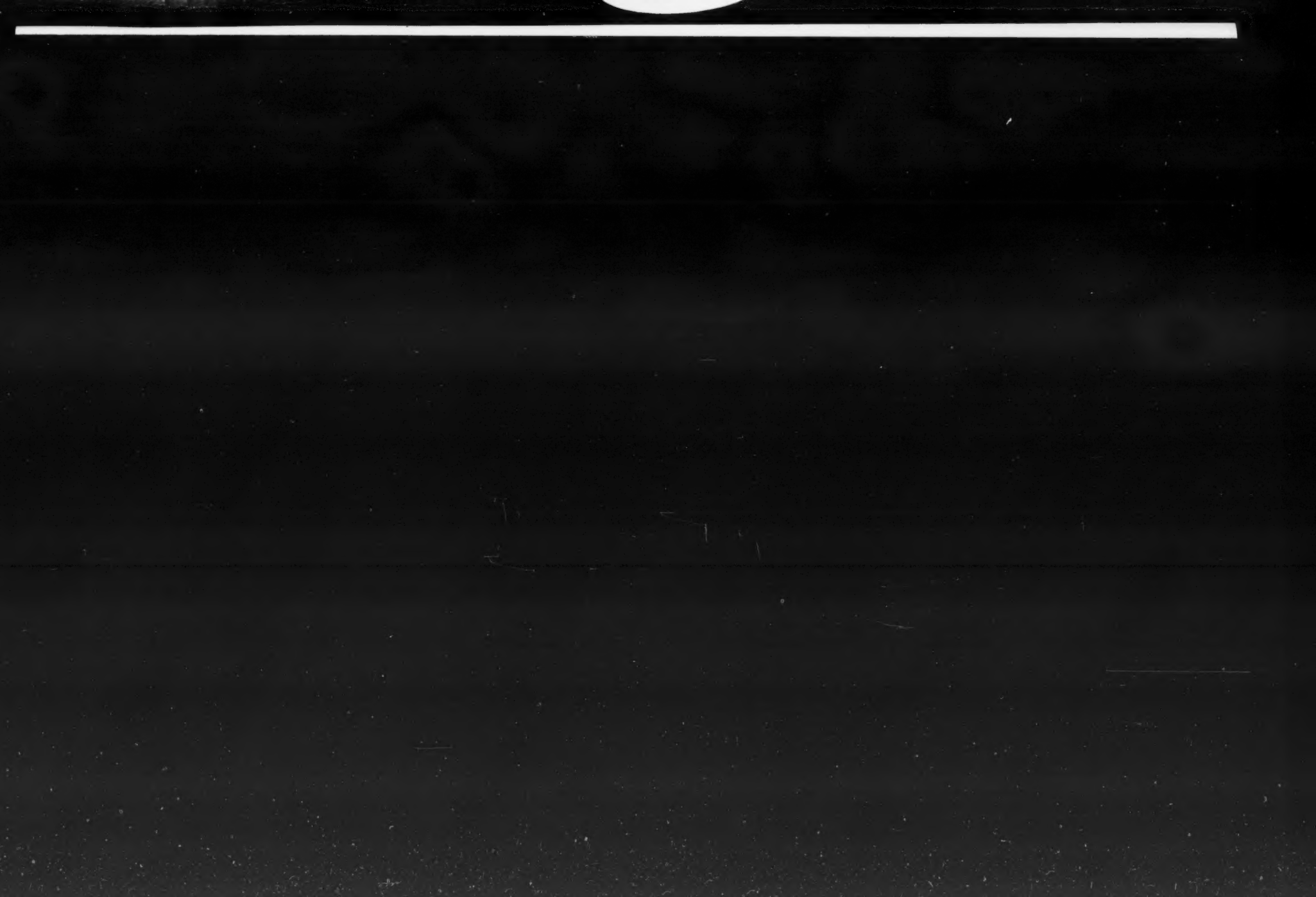

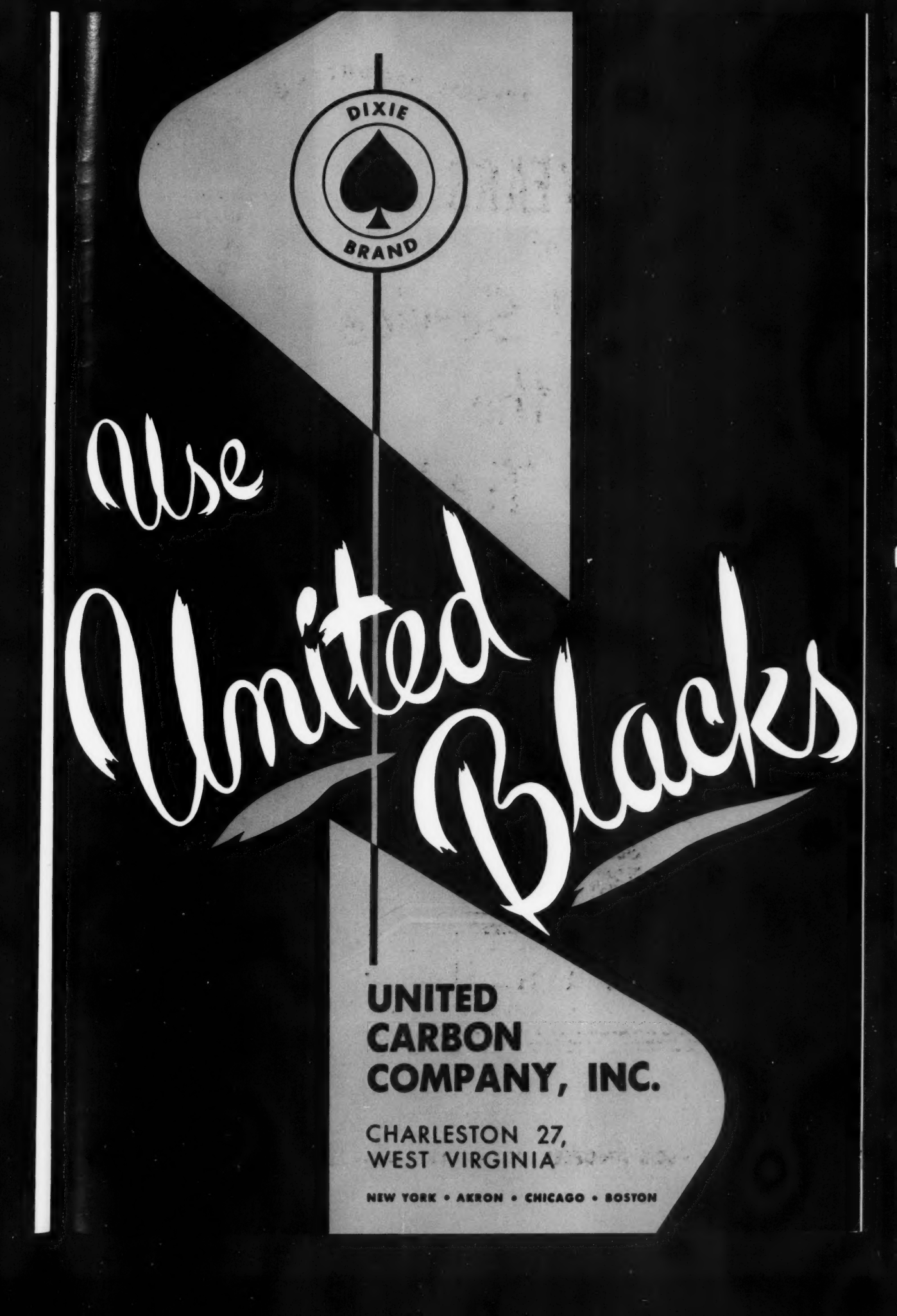
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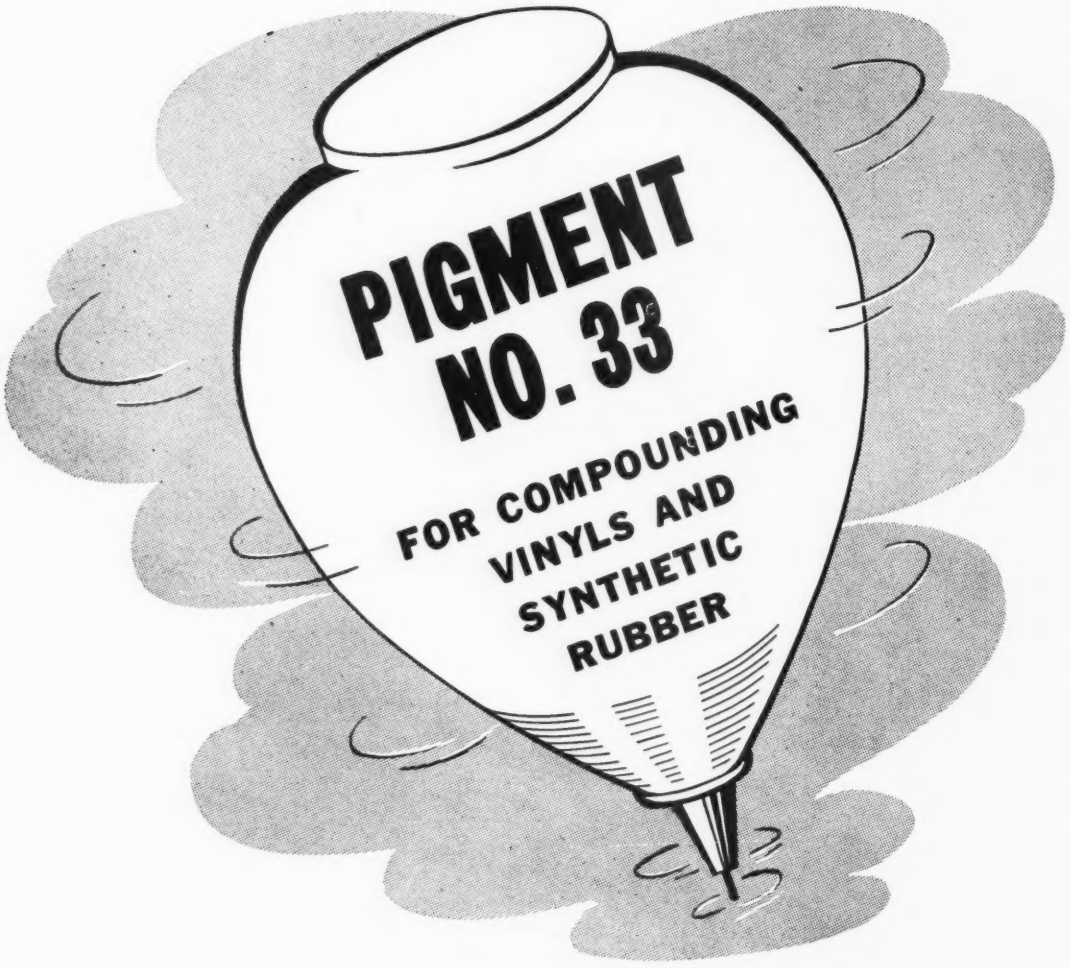

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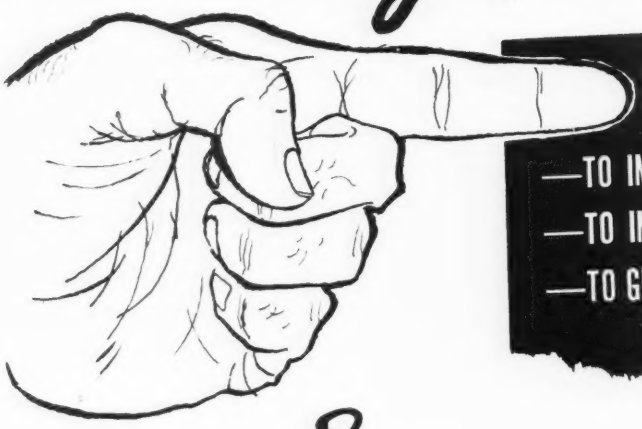

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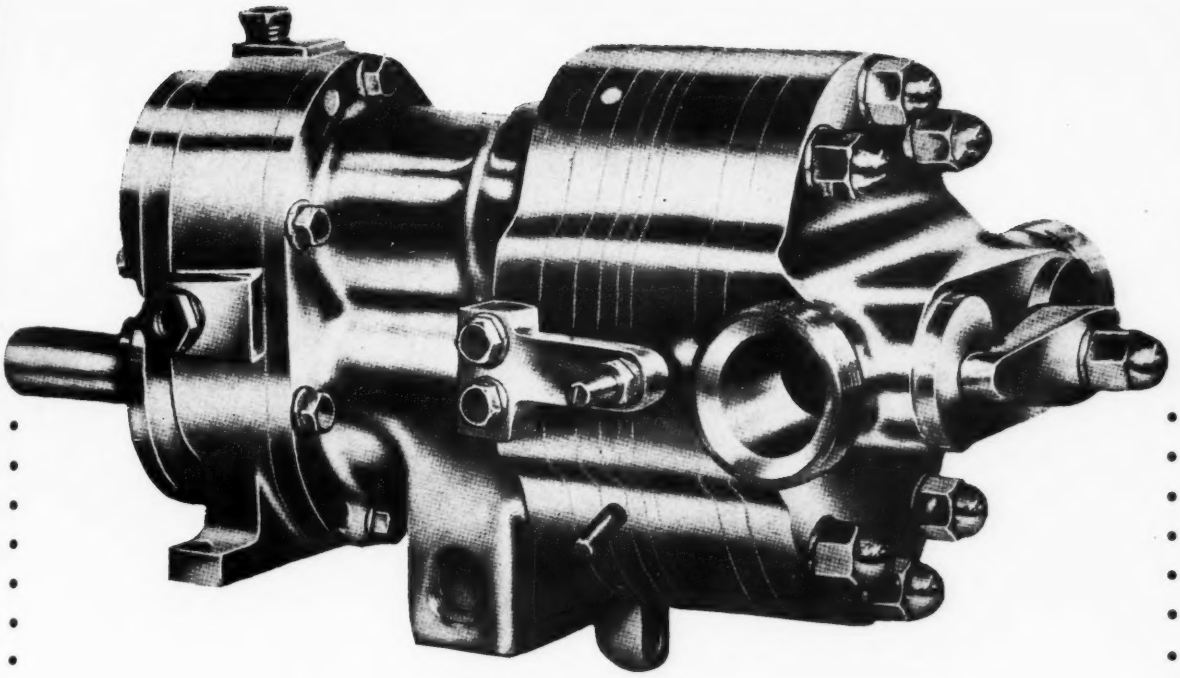

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MOLDS COME CLEAN *Everytime* WITH COLITE!

Just as a housewife butters a muffin tin, you can use Colite on any kind of a rubber mold. And you'll find using this highly-concentrated liquid mold-release, as a spray or sponge, pays off with substantial savings!

You can count on jobs coming out with uniform precision — with no pinching, dragging, trimming or spoilage to contend with — and with a transparent, smooth, satiny finish that insures added sales-appeal.

Non-toxic, non-tacky, odorless Colite, developed especially for the rubber industry, comes in a highly-concentrated form, which you dilute with water to the most effective strength for the stock and job at hand — making it economical to use! Send for a sample to test in your plant, now!

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Use as a lubricant for

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For light colored stock

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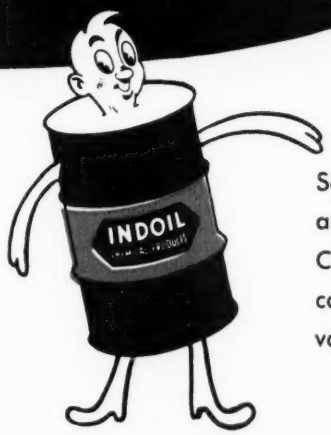

Send for Bulletin 13 and desired Circulars. Circular 105 covers compatability with various resins, etc.

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ADAMSON UNITED COMPANY
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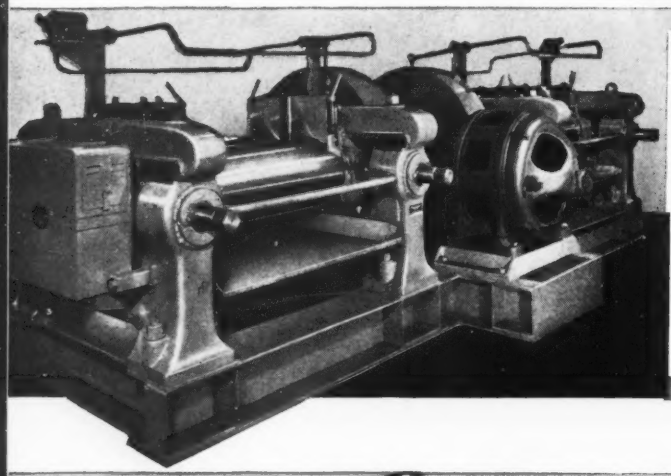
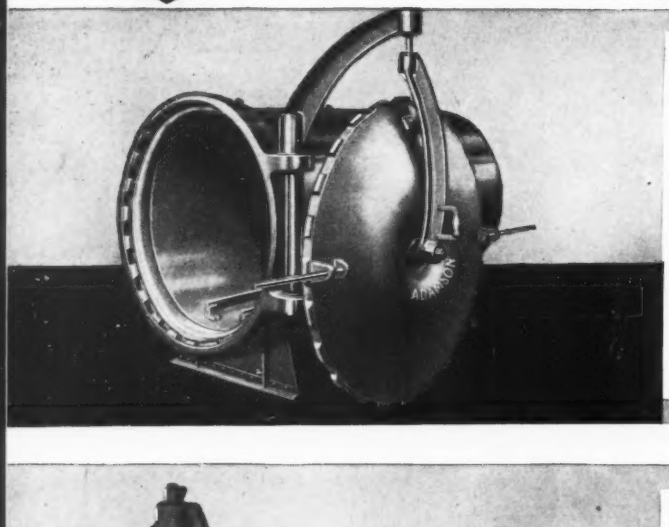
Plastics and R



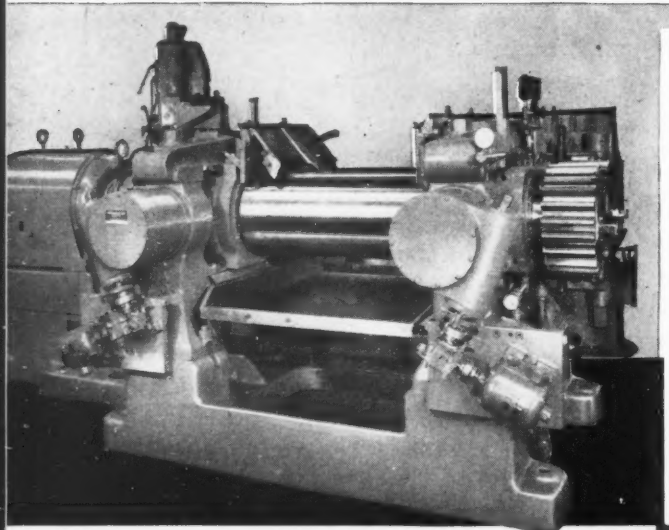
TWIN MILL UNIT

22" & 22" x 60" Mills designed and built for mixing and plasticizing an internationally known plastic material. The rolls operate in anti-friction bearings and the two Mills, together with right angle drive and motor, located between the units, are mounted on a continuous one-piece bedplate.



VULCANIZERS or AUTOCLAVES

Built in sizes ranging from 18 inches to 15 feet in diameter and any length, vertical or horizontal. Illustration shows a horizontal type with hinged, quick-opening door. Vulcanizers can be built to withstand internal pressures up to 1000 pounds per square inch. Write for our special bulletin .



MIXING MILLS

These are built in all sizes from 6" x 16" to 28" x 84". The one illustrated is a late model (shown without gear enclosure), designed for plastics. It has rolls 20" in diameter by 48" long on the working face; flood lubricated roll boxes; tilting stock guides; motor-operated adjusting screws; stainless steel stock pan; dial indicators for front roll position; two sets of connecting gears for operating rolls at two different friction ratios, and an individual motor drive, with geared head and flexible coupling direct-connected to rear roll.

We can supply any size Mill driven individually; in pairs with right angle reducer between the units; or grouped on a line shaft with reducer at one end of the shaft.

Write for our new catalog covering Mills, Refiners, Crackers and Washers.

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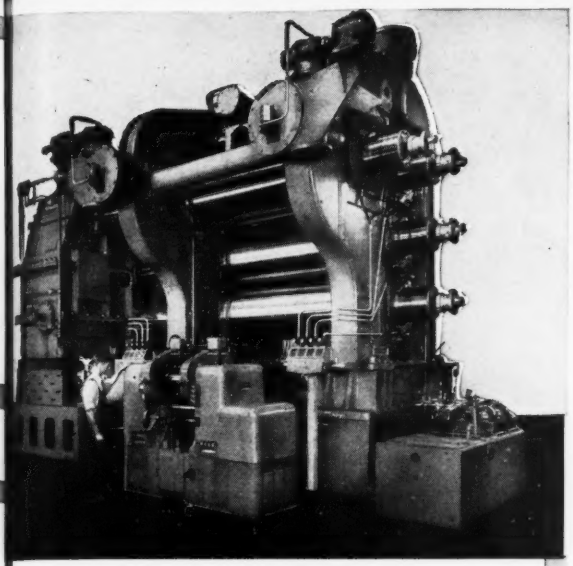


CALENDERS

The large Calender has four rolls measuring 36" in diameter by 92" long on their working faces. They are mounted in anti-friction bearings which are preset for precision operation at high temperature. Each roll is individually-driven from a separate gear stand. All bearings are flood lubricated from a central supply. The off-set, top and bottom rolls have individual motorized adjustment through double Cone worm reducers.

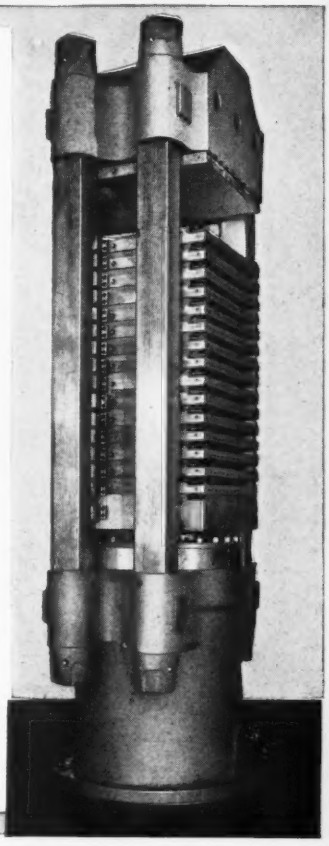
The small Calender in the foreground has four rolls measuring 8" in diameter by 16" long on their working faces. These rolls also operate in selected anti-friction bearings which are flood lubricated.

Each Calender is provided with motor and electric controls installed on flush mounted panels.

In addition to designing and building Calenders, we can supply all the processing equipment necessary for a complete operation. This includes plastic sheeting and the coating of fabrics with plastic or rubber compounds.

Write for our new calender catalog.

MULTIPLE DECK PRESSES



Multiple deck press with fifteen openings. This Press was constructed for extremely high pressures per square inch on the platens. We have standard designs for square platen presses in sizes varying from 12" x 12" to 60" x 60", and for Presses with oblong platens ranging from 12" x 14" to 70" x 84". Patterns and drawings are available for almost any size within the above two ranges but we are prepared to design and construct much larger ones.

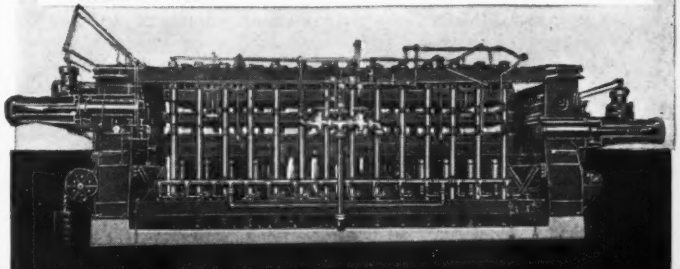
These Presses can be built self-contained or for connection to existing hydraulic supply.

Write for our new catalog covering our full line of Hydraulic Presses.

BELT PRESSES

Belt Press with two openings. Platens are 63" wide by 31' long. This Press weighs over 300 tons and will deliver 250 lbs. per square inch on the platens. It comes complete with stretchers and clamps, the latter mechanically controlled directly from the movement of the platens. Standard designs for various sizes are available.

In addition to the above we also make a full line of open side Presses equipped with stretchers and clamps to cure endless V-belts.



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- Washers
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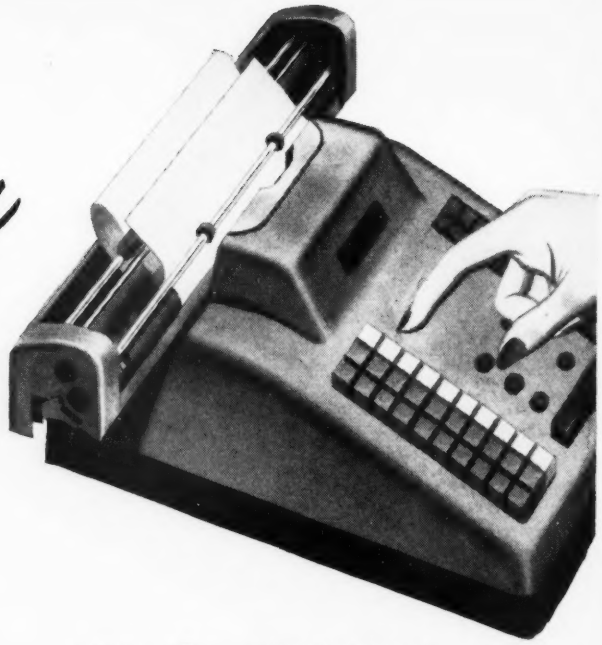
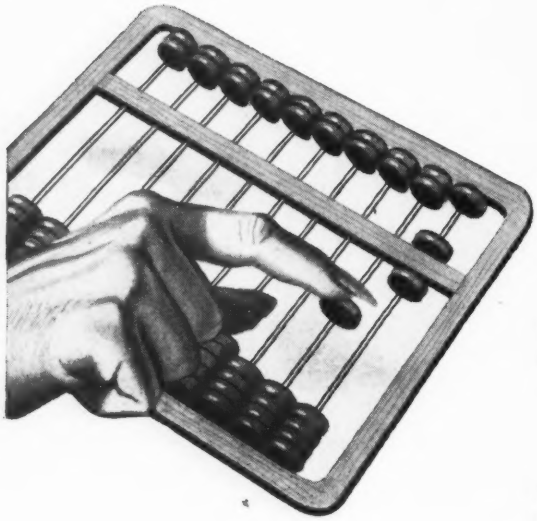
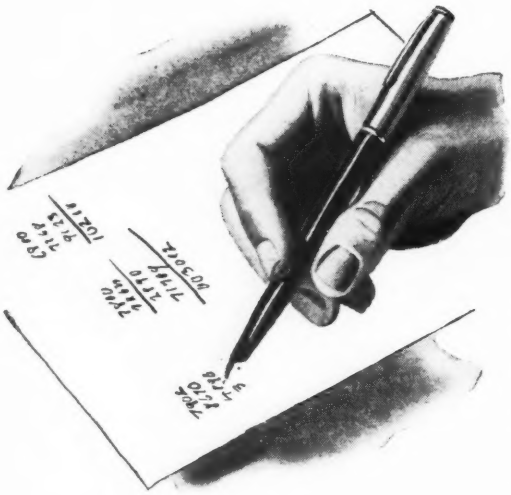
Any way you figure it...







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- **LESS WEAR ON DIES**
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Check the pound/volume comparison at right to see how SURFEX MM, a controlled quality precipitated calcium carbonate, can help you lower vinyl compounding costs and increase batch yields with no sacrifice in quality.

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YOU GET ALL OF SURFEX MM's ADVANTAGES AT NO EXTRA COST			
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DOP	.42	57	57
SURFEX MM	.0185	35	—
W-G Limestone	.009	—	34
Stabilizer	.57	3	3
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Tensile	—	2400 psi	2200 psi
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DIAMOND SURFEX FOR BETTER VINYLS

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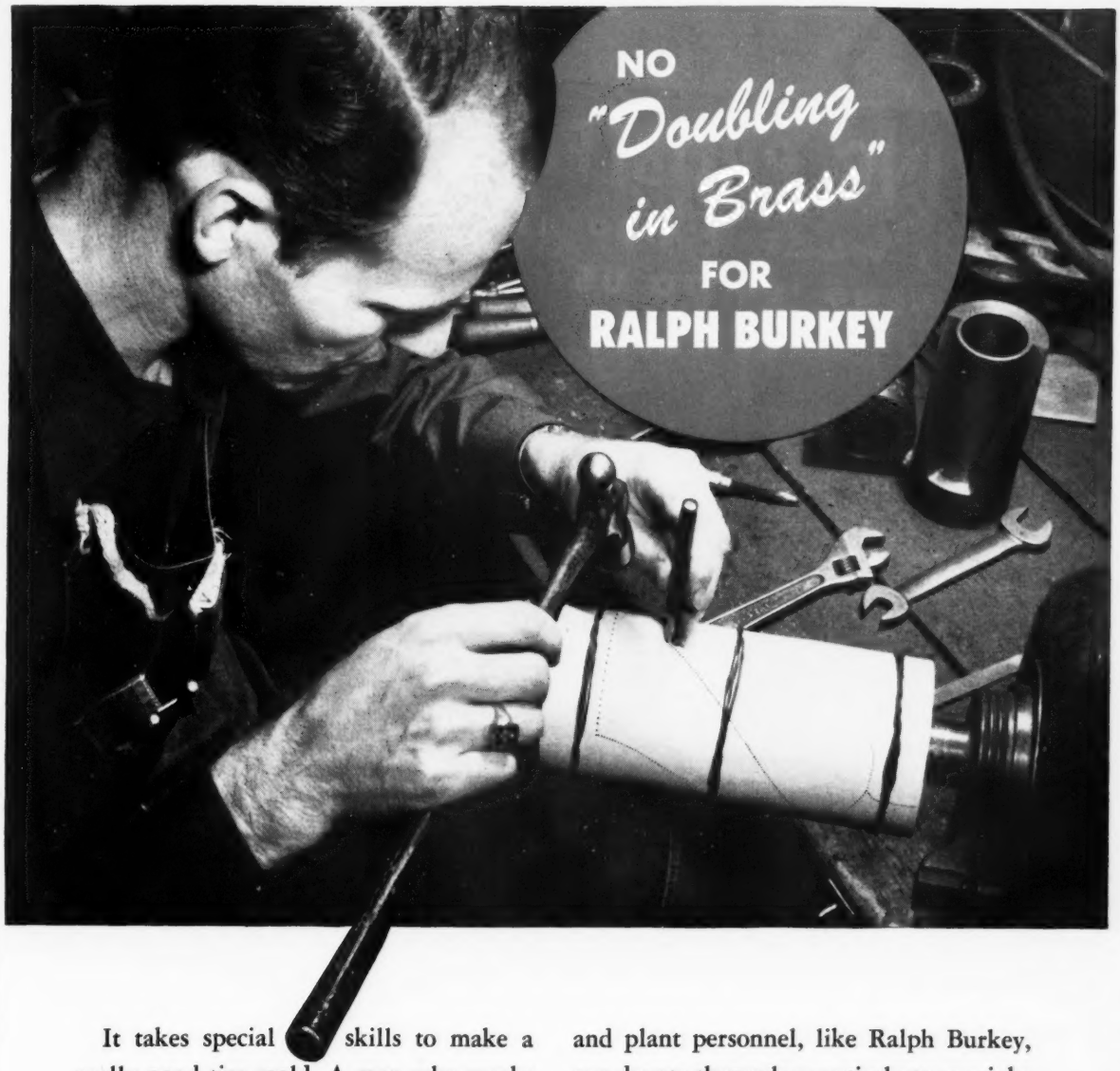

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That's why our Athens Machine Division turns out consistently better tire molds — for in Athens, plant management and plant personnel, like Ralph Burkey, can devote themselves entirely to one job: making better tire molds.

Our Athens Machine Division is a completely self-contained tire mold manufacturing plant, equipped with machines specially designed for tire mold manufacture, staffed with personnel highly trained in every step of mold making.

ATHENS MACHINE DIVISION

THE BRIDGWATER MACHINE COMPANY

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For easier-processing vinyls

PLIOVIC

PLIOVIC means easier processing in vinyls—on the mills, in the Banbury, on the calenders and in the extruders—because the chemical composition of these Goodyear vinyl chloride copolymer resins permits their processing at lower temperatures than similar copolymers.

PLIOVIC A and AR are in use in calendered films and flooring, extruded hose and tubing. PLIOVIC AO is being used in clear and colored unsupported cast films and in coatings for fabrics and papers. In either form, these resins yield tough, high-strength, long-wearing products with good light and heat stability, good chemical resistance and — in the case of films and coatings—with heat seals at 250°F-275°F.

Look over this list of properties and uses. See for yourself how PLIOVIC will fit into your production plans. Then write for full details and sample for your own evaluation to:

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CHEMICAL DIVISION
AKRON 16, OHIO

To Help You Evaluate PLIOVIC

Composition	Vinyl Chloride Copolymer
Form	Fine White Powder
Specific Gravity	1.39
Bulking Values	PLIOVIC A and AR—22 lbs./cu. ft. PLIOVIC AO—15 lbs./cu. ft.
Softening Point	187°F
Moisture Content	2.0% maximum
Intrinsic Viscosity	0.800-0.950
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Taste	None
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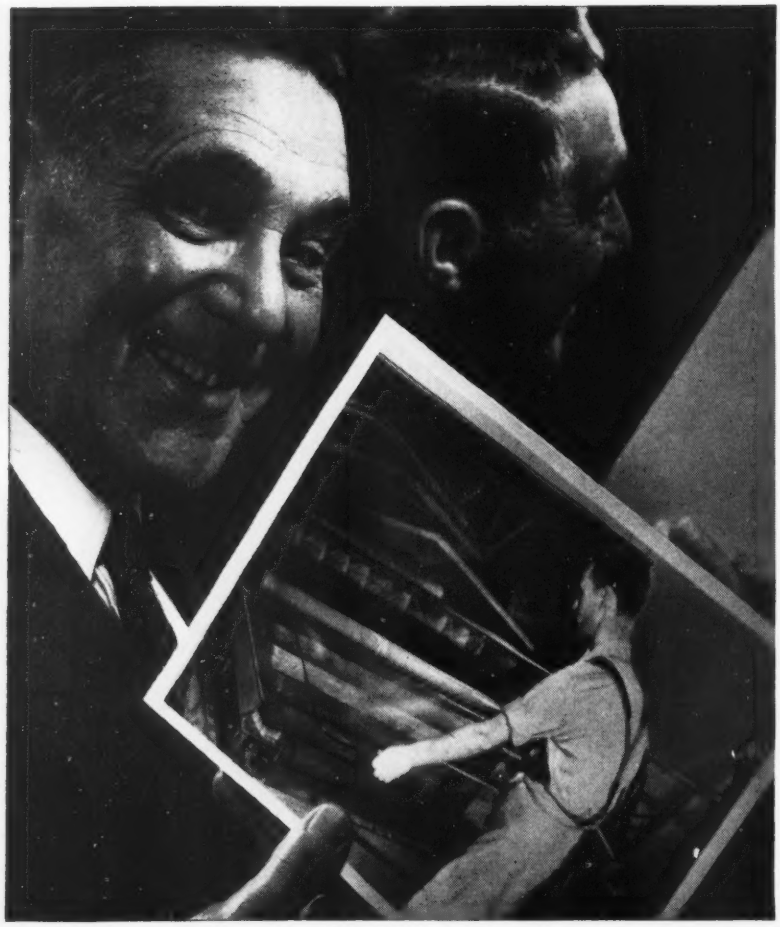

Look into this mirror for faster production

A brushing method used by a mirror manufacturer . . . or one similar to this . . . may help you improve product quality and cut rejects.

To provide a binder for the silvering compound, a base coat was formerly applied to the glass by hand. But uneven coating caused blemishes in the silver after drying. With the help of the **O**sborn **B**rushing **A**nalyst, a power brushing method with specially-engineered Osborn Heli-Master® Brushes was developed (1) to clean the glass thoroughly with water and (2) to *brush on* the base coat in a perfectly uniform film. Results: Blemishes in silvering practically eliminated. Mirror production has been stepped up and rejects cut to the bone.

Look into the possibilities of power brushing for the improving of *your* manufacturing . . . whether it involves glass, metal, rubber, plastics or textiles. To get the help of an **OBA**, call or write *The Osborn Manufacturing Company, Dept. 628, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

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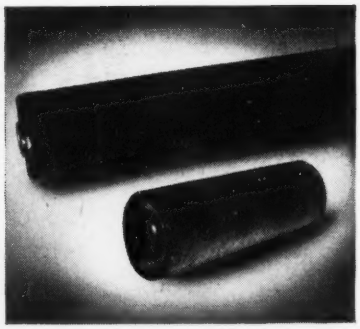
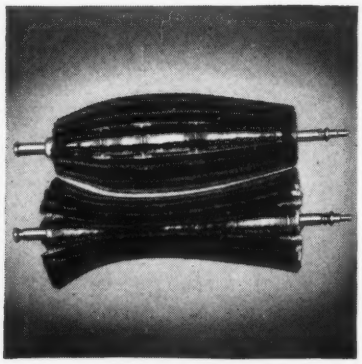
LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



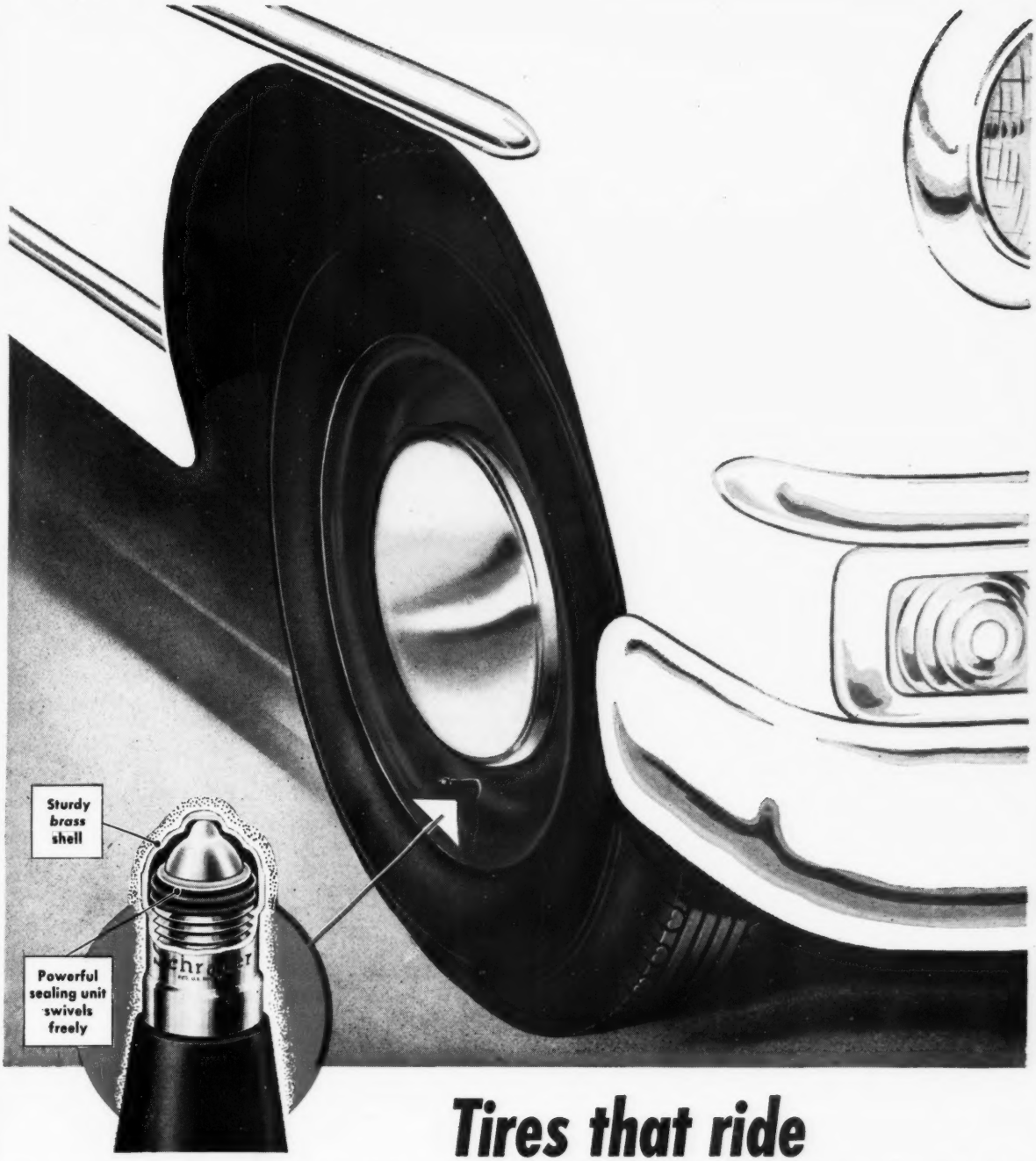
FOR HIGH SPEEDS. Osborn Heli-Master® "FA" Brushes provide a continuous, uniform density of fill up to a 180" brush face length. These can be built for many types of cleaning, scrubbing and finishing for smooth operation at speeds up to and exceeding 10,000 surface feet per minute. In wide range of fill materials for metallic and non-metallic materials.



FOR FLEXIBILITY. Osborn Rota-Master® Brushes may be used for wide-face applications such as glass washing, cleaning and unloading conveyor belts, wood staining, bus washing, rubber roughing, power sweepers. Open face design affords flexibility. Density is regulated by the number of Master strips employed.

FOR MANY JOBS . . . Osborn Master* Strip Brushes can be used in special mountings for a wide variety of power-driven applications—in straight strips or wound on an arbor as for the Heli-Master or Rota-Master Brushes. Have the **O**sborn **B**rushing **A**nalyst show you how these versatile brushes can help solve *your* problems.

*Trademark



Tires that ride to work and play

Load the family in the car. Head for the beach, the country, or town or church . . . with never a fear about the tires. They're built to give protection for many miles of easy, economical driving. A key to dependable tire performance is the valve that *locks* the air in the tire.

Schrader Tire Valve Caps are designed with the metal outer shell and the specially compounded rubber sealing unit *doubly* reinforced with non-collapsible metal plates. Schrader Valve Caps are *guaranteed* air-tight up to 250 lbs. You can be sure any vehicle, any tire, equipped with Schrader Tire Valves, sealed with these *quality Schrader Caps,* has positive protection at this vital point.

A. SCHRADER'S SON, BROOKLYN 17, N. Y.

Division of Scovill Manufacturing Company, Incorporated

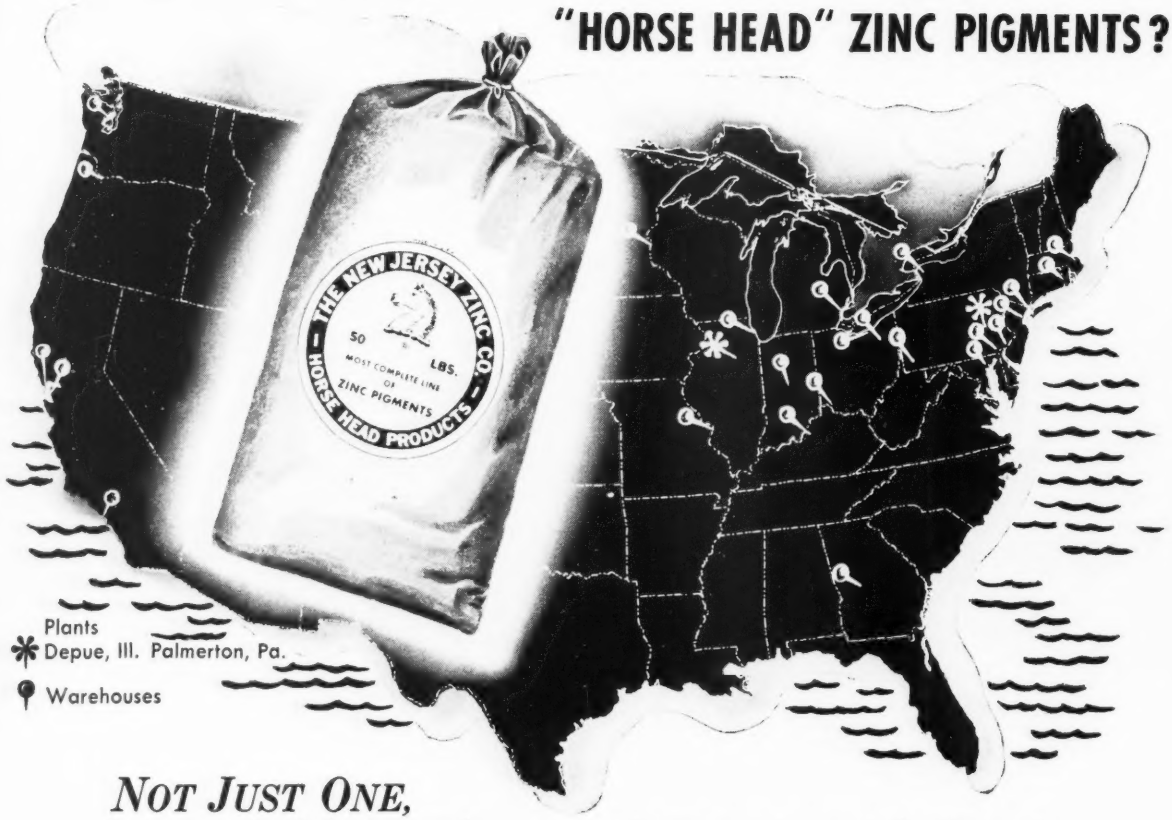
Schrader

REG. U. S. PAT. OFF.

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

Which of these 26 depots ensure YOUR supplies of "HORSE HEAD" ZINC PIGMENTS?



NOT JUST ONE,

but several, of these warehouses guard your requirements for the various brands of Horse Head zinc pigments — wherever you are.

Whether you need a regular L.C.L. shipment or an emergency supply between carloads, you can count on Horse Head warehouses to protect your production schedules.

This is why:

1. The Horse Head distribution system consists of an integrated nationwide network of warehouses:
   - 5 on the Pacific Coast
   - 10 in the Midwest
   - 11 in the East and South
2. An unexpectedly heavy call on any one is promptly met by shipments from one or more of the others nearby.

Thus you get maximum delivery service:

1. Fast deliveries
2. Storage reserve in depth
3. Your choice from the most complete line of zinc pigments

THE NEW JERSEY ZINC COMPANY

Founded 1848

160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

Triple Victory

IN MACAULAY'S FAMOUS POEM, Horatius stood before the narrow bridge to Rome and saved the city by slaying Lars Porsena's three ablest warriors.

Now, no one's going to write poetry about IONOL® . . . the antioxidant that is proving so successful in rubber goods manufacture . . . but there *is* a parallel!

IONOL, too, is a determined fighter of three tough aggressors—oxidation . . . staining . . . discoloration of quality rubber products. This tri-substituted hindered phenol retains its effectiveness through long exposure to light, air and heat . . . even when copper salts are present. Because of its triple action against oxidation, IONOL contributes longer life and better performance to rubber products.

While the demand for IONOL currently exceeds production capacity, it will pay you to give serious consideration to its advantages in your product development planning.

IONOL IS ALREADY IMPROVING THESE:

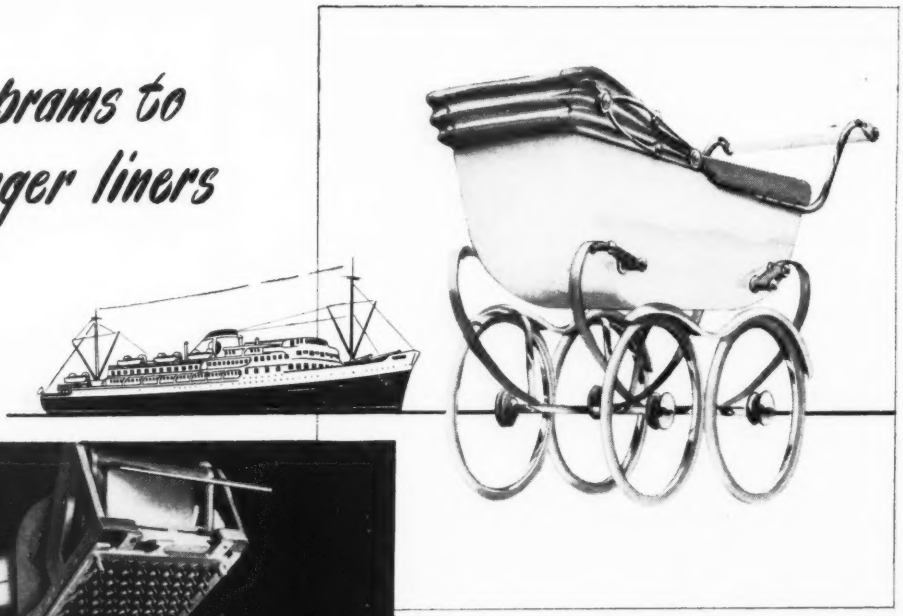
Pressure sensitive tape • Asphalt and rubber tiles • Drug sundries
Rubber coatings for wire • Light-colored extruded specialties
Swimming accessories • Play shoes

SHELL CHEMICAL CORPORATION

CHEMICAL PARTNER OF INDUSTRY AND AGRICULTURE

Eastern Division: 500 Fifth Avenue, New York 18, N. Y.
Western Division: 100 Bush Street, San Francisco 6, Calif.

from prams to passenger liners



THE McNEIL MECHANICAL GOODS PRESS

Every form of transport from prams to luxury liners depends on rubber or plastic products. For long lasting, more uniform finishes on these varied vital products, builders of bicycles, cars, trains, trucks, ships and planes look to products from Shaw Rubber and Plastic machines.

Motor operated — no hydraulic

800,000 pounds total pressure

32" x 32" Drilled Steam Platens

780 pounds per square inch platen pressure

Simple speedy adjustment of lower platen

Adjustments for mould loadings zero to 400 tons

Range of mould thicknesses 1" minimum to 5" maximum or 2" minimum to 6" maximum

SHAW

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industrys headquarters for the best in rubber and plastic machinery

AZO-ZZZ-55
zinc oxide

AZO ZZZ-55

Uniform particle size and absence of extreme "fines" assures good dispersion and easy processing.

***AMERICAN ZINC SALES CO.**

Distributors For

AMERICAN ZINC, LEAD & SMELTING CO.

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MACHINERY and EQUIPMENT for RUBBER and PLASTICS

VOLUME I

PRIMARY MACHINERY AND EQUIPMENT

Now Ready for Press

The only book of its kind ever offered to the Rubber and Plastics Industries and the first to be published since Pearson's "Rubber Machinery" in 1915. Compiled by Robert G. Seaman and Arthur M. Merrill, the present Editors of India RUBBER WORLD, with the cooperation of an Editorial Advisory Board of experts in their respective fields. Each chapter is preceded by an article written by recognized authorities on the equipment, its purposes for specific products, and best method of using it.

Volume I has over 800 pages of editorial content with authoritative descriptions for each machine classification: Types, Specifications, Design Features, Operation, and Applications, as well as names and addresses of the manufacturers or suppliers. More than 300 illustrations. Cloth-bound for permanence.

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Volume II — Supplementary Machinery and Equipment — is now in preparation and will be published in the near future.

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386 FOURTH AVENUE

A BILL BROTHERS PUBLICATION

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Reds

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Yellows

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- SOFT AND EASY TO GRIND
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- ALKALI RESISTANT
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With a combination of advantages found in no other red or yellow pigments—the direct result of Glidden leadership in research—Glidden Cadmolith* Colors are now adding new sales appeal and lasting beauty to an amazing variety of products . . . available for prompt shipment!

Send for Folder giving complete details, with color chips. Write The Glidden Company, Chemical & Pigment Company Division, Union Commerce Building, Cleveland 14, Ohio.

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QUALITY Glidden PRODUCTS

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Baltimore, Md. • Collinsville, Ill. • Hammond, Ind. • Oakland, Calif.

SUNOLITH* Lithopone

ZOPAQUE* Titanium Dioxide

TITANOLITH* Titanated Lithopone

398 D-O's IN 1951!

The acceptability of Scott Testers* by government and industry as providing a recognized standard of test values for procurement and production, is indicated by the large number of D-O's processed by us in 1951 . . . also by the fact that our 1952 projected output of instruments is entirely on D-O ratings.

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REQUEST
CATALOG 50

SCOTT TESTERS, INC., 90 BLACKSTONE ST., PROVIDENCE, R. I.

Scott Testers — Standard of the World

Rubber

natural

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HERE'S HOW

you can relieve yourself of the bothersome and time-consuming details of buying rubber. Simply arrange for S. J. Pike & Co. to service purchases for you.

Years of experience assure complete knowledge of grades and prompt execution.

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NEVSOLV aromatic Petroleum Solvents are available in a number of different distillation ranges from low boiling to high boiling. In addition to the standard distillation ranges, we invite inquiry on special fractions to meet your particular requirements. NEVSOLV Solvents are manufactured to rigid specifications, insuring high solvent power, constant evaporation rates and negligible residue.

Write for samples and further information on these uniform Neville solvents.

THE NEVILLE COMPANY

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Plants at Neville Island, Pa., and Anaheim, Cal.

Part of Neville's current expansion program is this new plant recently completed at Neville Island, for the production of NEVSOLV Solvents

A-43

BRATEX
RUBBER HOLLAND

We are putting our hand right down on top of this advertisement, covering up all the advertising man's brags and claims — and we are saying the story can't be told in words. There is no sense arguing about rubber holland in an advertisement — it's got to be demonstrated.

Will you please send for samples of Bratex Rubber Holland and give those samples a test? That's all there is to it — and there is no use in saying any more. Bratex is 7 ways better. You try it and count them.

Write for those samples today.

THE HOLLISTON MILLS, INC.
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CORPORATION
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BRANCHES: CHICAGO, ILL. AKRON, O. DETROIT, MICH. LOS ANGELES, CAL.

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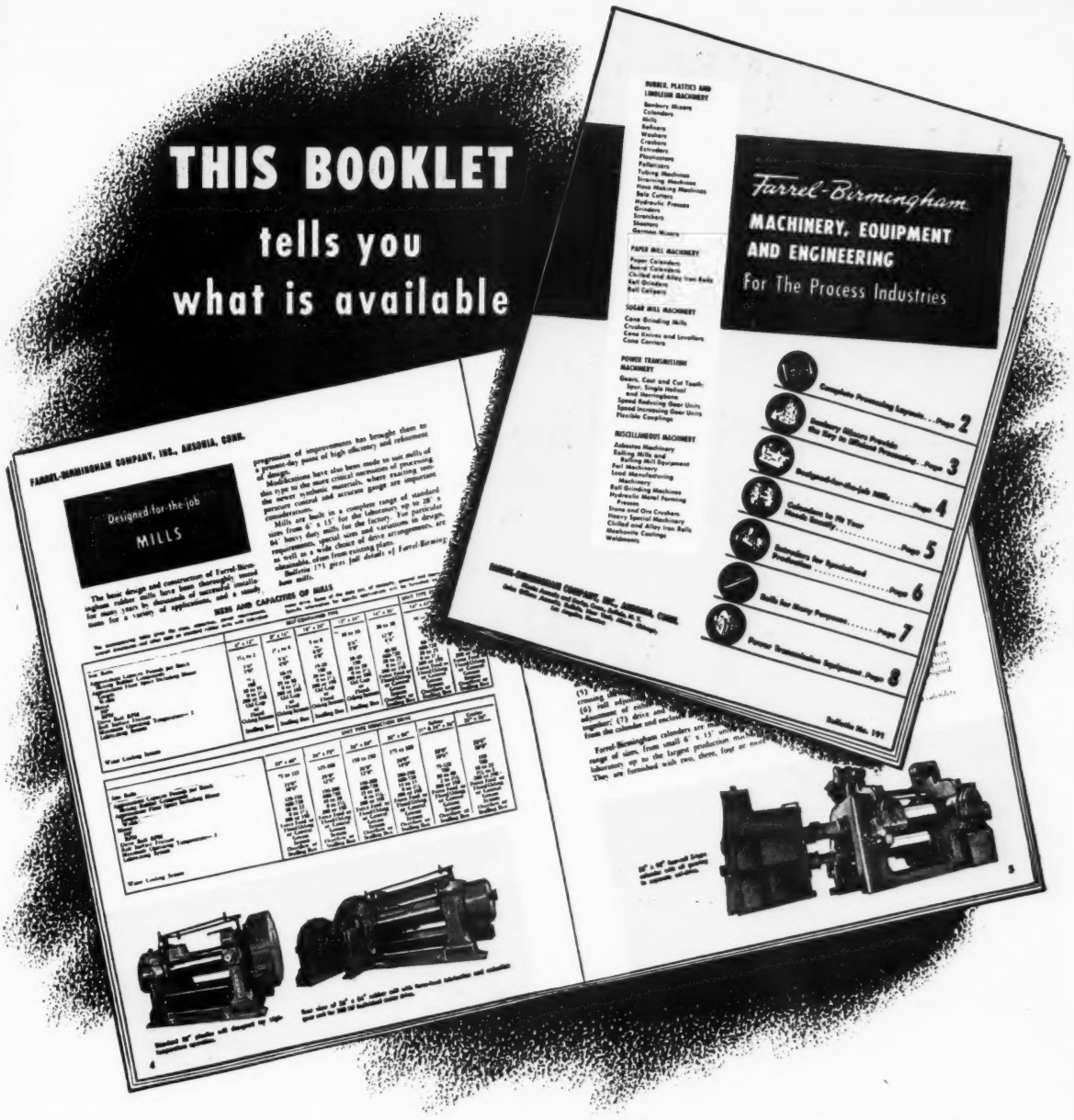
Latex and Latex Compounds

for all purposes



This *NEW*, 8-page bulletin provides an outline of the machinery, equipment and engineering service available to you from *the largest producer in the United States of rubber and plastics processing equipment.*

Page 2 describes the development of complete processing layouts by Farrel-Birmingham's Engineering Planning Division. Three schematic diagrams of typical setups are shown.

The next four pages are devoted to descriptions and illustrations of four of the company's principal lines of products – Banbury mixers, mills, calenders, and extruders for specialized production. Tables giving sizes and capacities of standard Banbury mixers and mills are also included.

Page 7 features rolls, which are designed and manufactured for practically any application. The last page describes power transmission equipment—speed reducing and speed increasing gear units, right angle vertical shaft drives and Farrel Gearflex couplings.

Send for a copy of this handy bulletin today. No cost or obligation.

FB-708

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Plants: **Ansonia and Derby, Conn., Buffalo, N. Y.**
Sales Offices: **Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston**

Farrel-Birmingham

FARREL-BIPMINGHAM COMPANY, INC.
Ansonia, Connecticut

Please send me a copy of bulletin 191, "MACHINERY, EQUIPMENT AND ENGINEERING FOR THE PROCESS INDUSTRIES".

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Manufacturers of CANARY LINERS

Mildew-proofing *and* Flame-proofing Cotton Fabrics as per Government Specifications. *Write or Wire for Samples and Quotations.*

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synvarite RC resins

- Compatible with variety of rubbers
- Can also be used advantageously with Natural rubber and Neoprene
- Improves processing and molding
- Improves the following:

Hardness
Chemical Resistance
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Also:
SYNVARITE RC Resins and Solutions for Rubber Cements and Adhesives. Excellent Solvent Release.
Liquid Resins, SYNVAROL AND SYNVAREN, compatible with Synthetic and Natural Latices for Cements and Adhesives.

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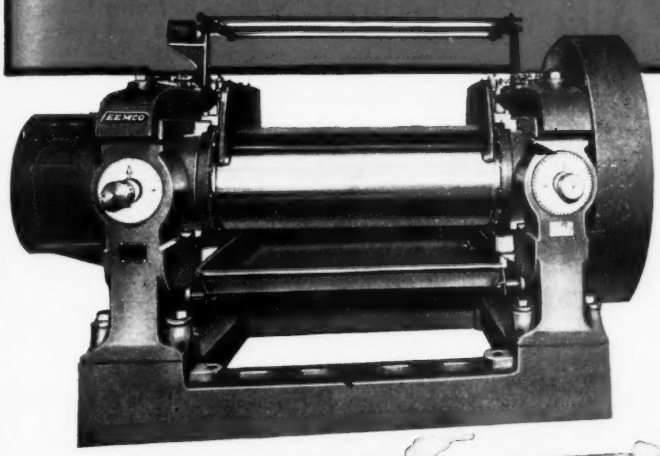

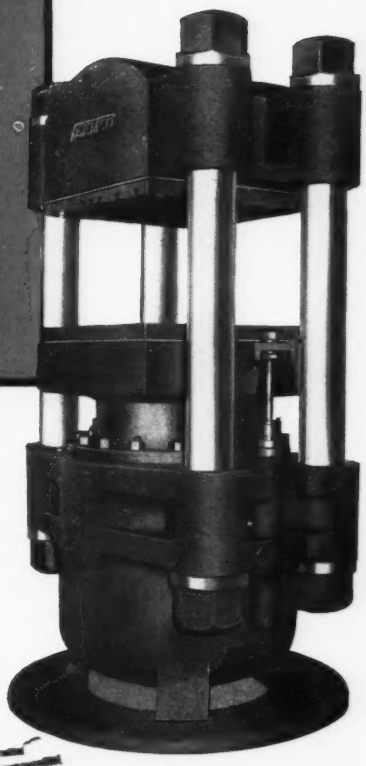

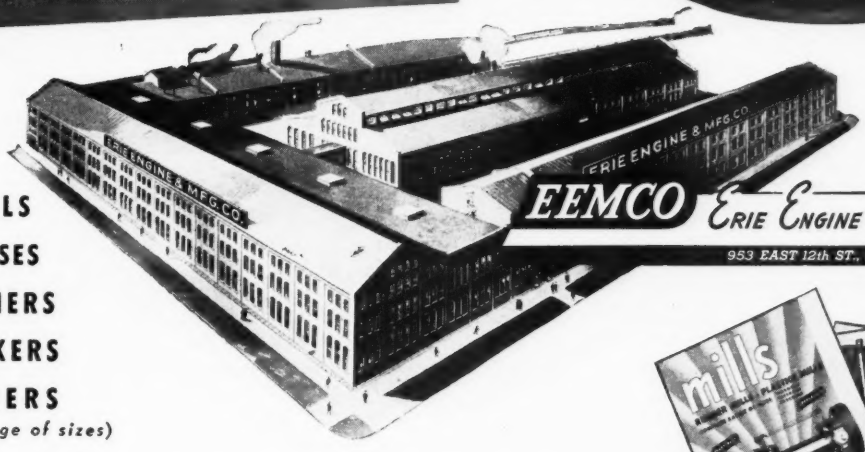

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PRESSES
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CRACKERS
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(Complete range of sizes)

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In this large modern factory rubber and plastics machinery has been built for the past 35 years. With installations throughout the world, EEMCO mills and presses are built for long life and heavy duty and are made by expert craftsmen to give unexcelled performance. EEMCO has its own Foundry, Machine Shop, Engineering Department, and Assembly Floor to insure fast delivery. Before you buy, get price and delivery dates from EEMCO.

Send for latest mill and press folders. Compare price, performance and shipment of EEMCO rubber and plastics processing machinery before you buy.

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Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also to our aqueous dispersions and hydrocarbon solutions of "Factice" for use in their appropriate compounds.

Continuing research and development in our laboratory and rigid production control has made us the leader in this field. The services of our laboratory are at your disposal in solving your compounding problems.

Oldest and Largest Manufacturers of "Factice" Brand Vulcanized Oil Since 1900

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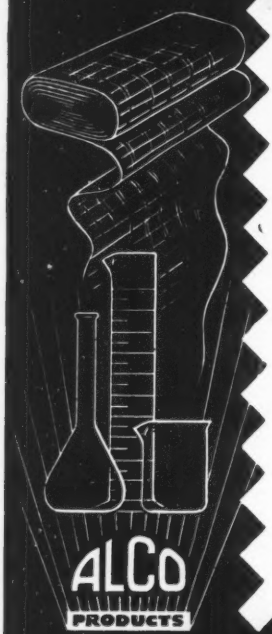

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Compounding Dispersions of Rubber Chemicals, are now available for Latex Compounding

VULCARITES are supplied as individual dispersions of zinc oxide, sulfur, antioxidants and accelerators. Composite dispersions of these chemicals are also available.

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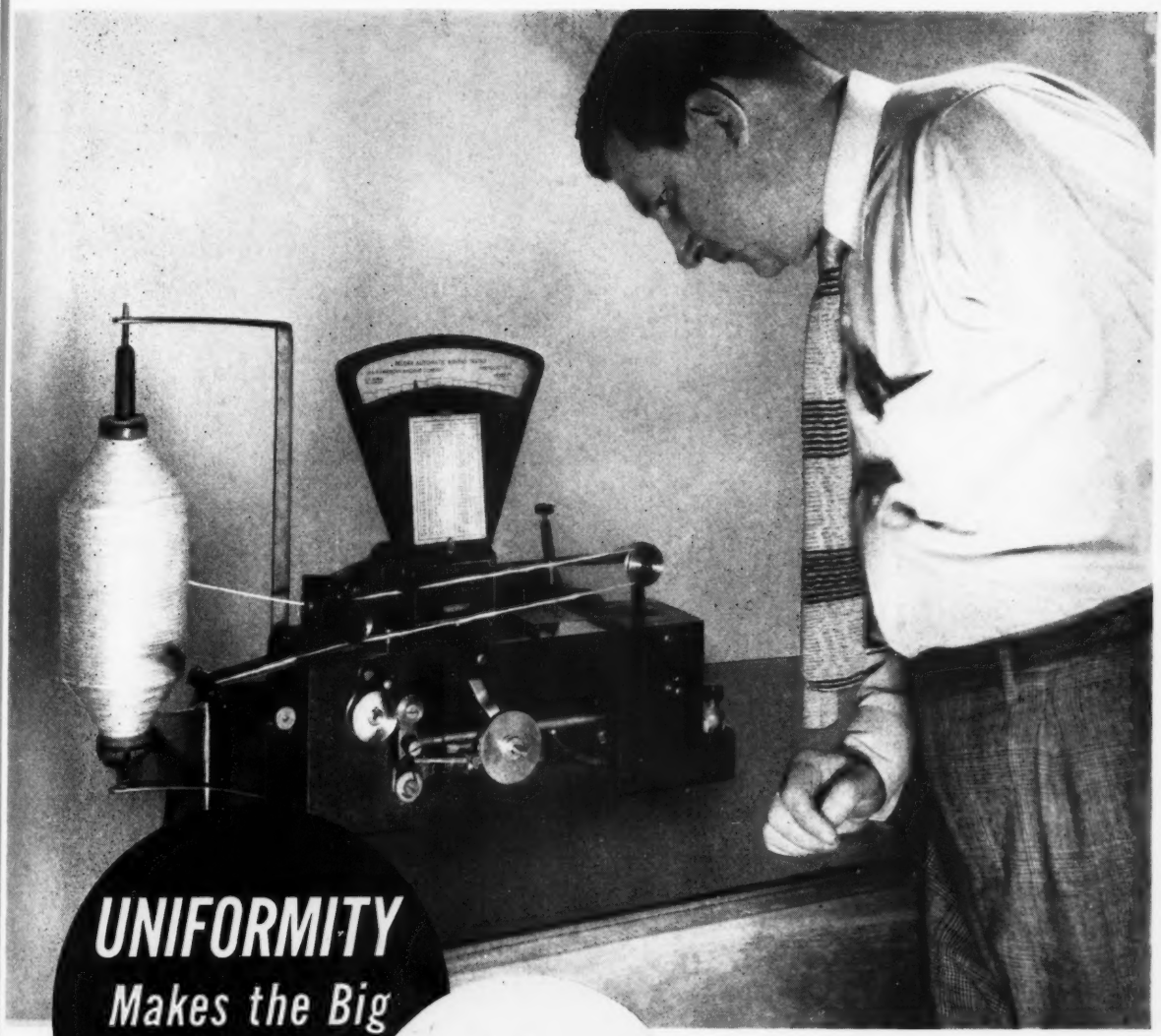

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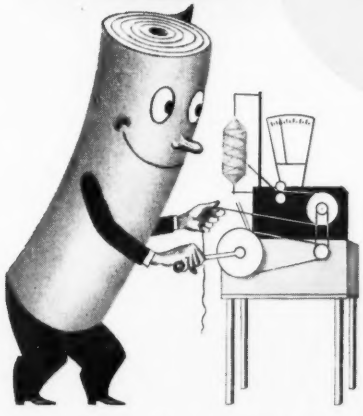
Makes the Big Difference
In INDUSTRIAL Fabrics



MT. VERNON FABRICS Give You Greater Fabric Uniformity

Shown is one of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. Here coefficient of variation and average factors of quality on evenness in roving is being checked with Belger Tester.

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A LOW COST BUNA N PLASTICIZER

Excellent for LIGHT COLORED PRODUCTS

SPECIFY GRAVITY	0.9440
COLOR, NPA	1½
REFRACTIVE INDEX	1.553
DISTILLATION, °F	560-730
ODOR	Excellent
VISCOSITY, SSU @ 100°F	240

SAMPLES ON REQUEST

PANAFLEX BN-1

PANAFLEX BN-1 is an economical, light-colored plasticizer for synthetic rubber — especially butadiene-acrylonitrile type.

This hydrocarbon plasticizer *completely* replaces dibutyl phthalate in nitrile rubbers—produces soft vulcanizates having high tensile, excellent elongation, and very low modulus. **PANAFLEX BN-1** plasticized stocks possess good ageing properties, superior electrical characteristics, and show good gasoline and oil resistance.

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PAN AMERICAN DIVISION
Pan American Refining Corp.
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Plant
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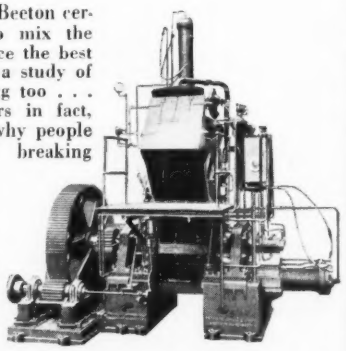
Take six eggs and 1 lb. of butter.

. . . and so on. Mrs. Beeton certainly knew how to mix the best things to produce the best results. We've made a study of the subject of mixing too . . . for the last 72 years in fact, which is no doubt why people with problems of breaking down, mixing or blending natural and synthetic rubbers, plastics and many other materials, have realized that the Shaw Intermix is their answer.



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Industry's headquarters for the best in Plastic & Rubber Machinery

FRANCIS SHAW & COMPANY LIMITED
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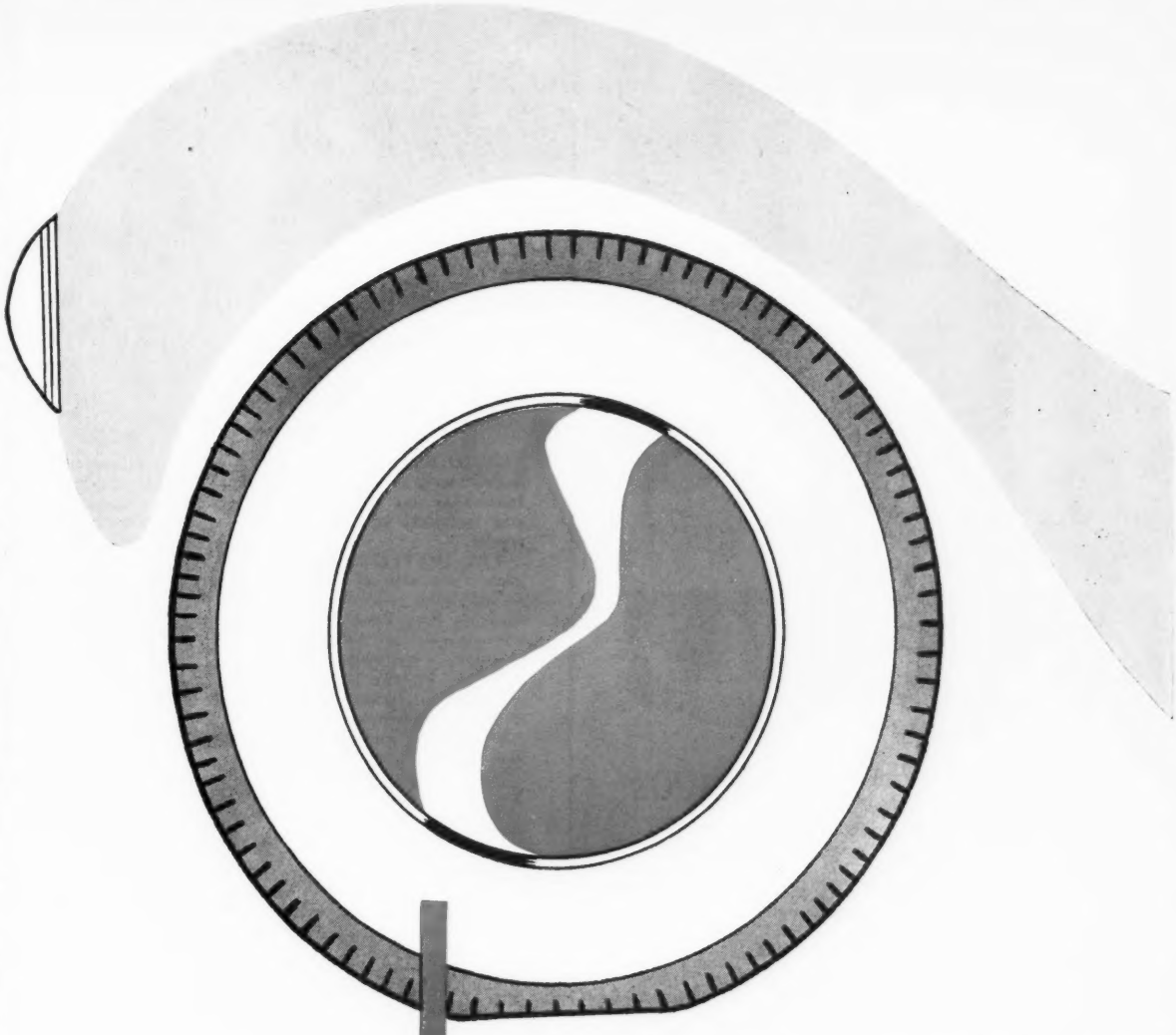


Retard flex cracking and oxidation

Whether your products are made of natural, synthetic or reclaimed rubber, you can retard oxidation and flex cracking by the use of Monsanto Antioxidants. These proved-in-service chemicals are available for immediate delivery.

Santoflex* **B, Santoflex BX** and **Santoflex 35** retard flex cracking and oxidation.

Santowhite* **Crystals, Santowhite MK** and **Santowhite L** are nonstaining antioxidants for light-colored products.

Flectol* **H** retards oxidation and heat deterioration in compounds that do not require exceptional resistance to flex cracking.

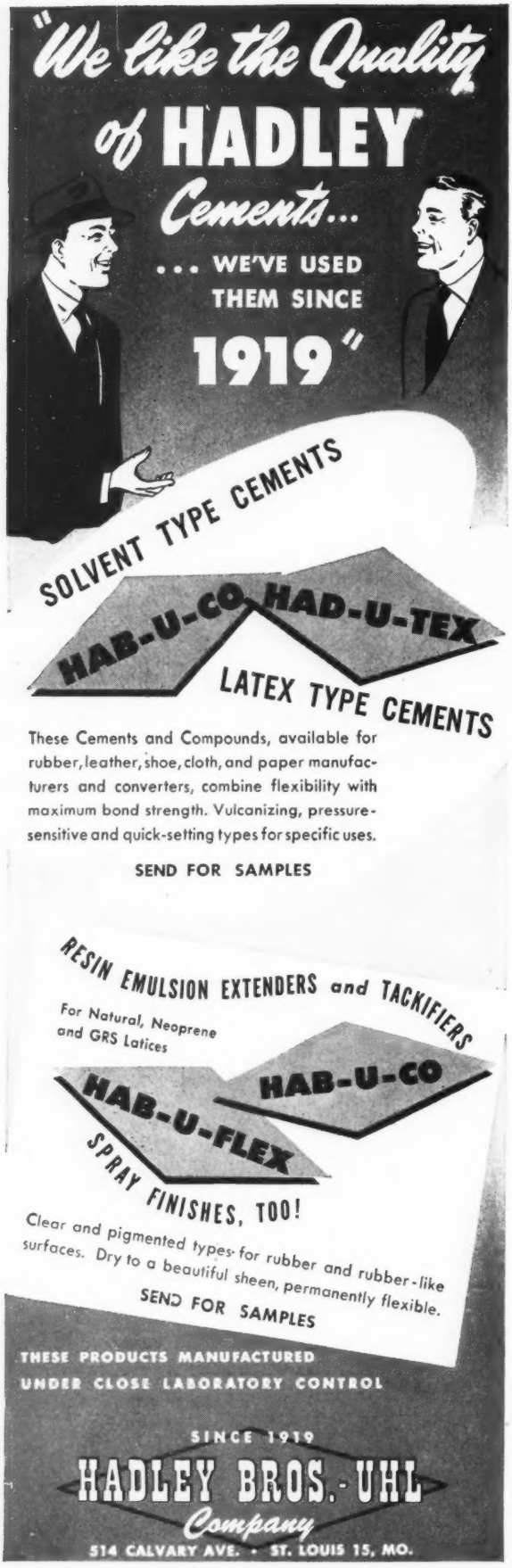
Antioxidants are among some two score chemicals Monsanto produces especially for the Rubber Industry. For information on chemicals for rubber, get in touch with MONSANTO CHEMICAL COMPANY, Rubber Chemicals Sales, 920 Brown St., Akron 11, Ohio.

Reg. U. S. Pat. Off.

ANTIOXIDANTS

MONSANTO
CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND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... WE'VE USED THEM SINCE 1919"
SOLVENT TYPE CEMENTS
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These Cements and Compounds, available for rubber, leather, shoe, cloth, and paper manufacturers and converters, combine flexibility with maximum bond strength. Vulcanizing, pressure-sensitive and quick-setting types for specific uses.
SEND FOR SAMPLES
RESIN EMULSION EXTENDERS and TACKIFIERS
For Natural, Neoprene and GRS Latices
HAB-U-CO
HAB-U-FLEX
SPRAY FINISHES, TOO!
Clear and pigmented types for rubber and rubber-like surfaces. Dry to a beautiful sheen, permanently flexible.
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THESE PRODUCTS MANUFACTURED UNDER CLOSE LABORATORY CONTROL
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THE INSTITUTION OF THE RUBBER INDUSTRY

The Institution of the Rubber Industry

LONDON

THE RUBBER INDUSTRY owes its development largely to scientific and technical research and the Institution was founded in 1921 to foster scientific and technical advancement and to disseminate the results.

THE INSTITUTION TODAY is the centre of a great fraternity of rubber manufacturers, scientists, technologists, research establishments, executives and students from every country whose object is the advancement of the cause of the rubber industry throughout the world.

OBJECTS: To promote corporate and concerted effort in the industry by bringing together all those engaged or interested in the various branches of science and technology on which the Industry is based and co-ordinating their respective contributions.

To promote the profession and practice of Rubber Technology.

To encourage the extension of scientific and technical education in the principles and details of rubber manufacture.

To maintain a scheme of Diplomas for the recognition of efficiency in knowledge of all branches of technology essential to the successful maintenance and development of rubber manufacture.

To arrange for the holding of meetings, the reading of papers and the giving of lectures with subsequent discussions and publication.

To foster the systematic study of scientific and technical problems involved in the various phases of the manufacture of natural and synthetic rubbers and rubber-like materials and their conversion into finished products.

To encourage original work and research dealing with the manufacture of rubbers.

PUBLICATIONS.

The Transactions: Bi-monthly record of scientific and technological investigations in the realm of rubber and its allied industries.

Annual Report on the Progress of Rubber Technology: containing systematic accounts of the developments in rubber technology from year to year.

Proceedings of Rubber Technology Conferences.

INVITATION TO MEMBERSHIP.

At this time of progress and expansion in the affairs of the Institution, its Council, conscious of the benefits that lie within the sphere of the Institution, invites applications for the privilege of membership from those engaged or interested in the Rubber and its allied industries.

Application forms and full particulars may be obtained from:—

THE REGISTRAR

INSTITUTION OF THE RUBBER INDUSTRY

12, WHITEHALL

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Shipped the Way You Want It, When You Want It, To Every Major Rubber Center of the Nation

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Carload shipments, in either bag or bulk, are made directly from General Atlas plants. Bulk shipments are made in specially designed company-owned covered hopper cars to PELLETEX consumers within the limits of the continental United States and Canada.

Overseas member of the Pelletex selling team is Cabot Carbon Limited of England.

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Ohio Building, Akron, Ohio

HERRON & MEYER OF CHICAGO
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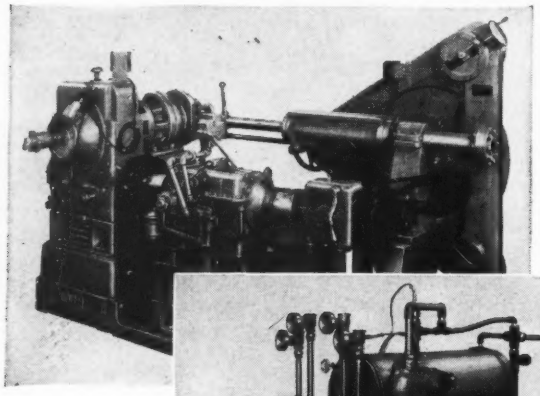

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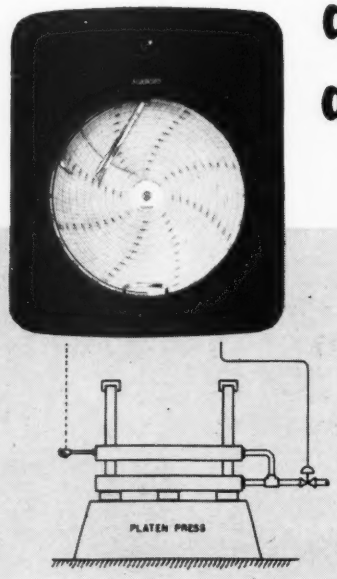

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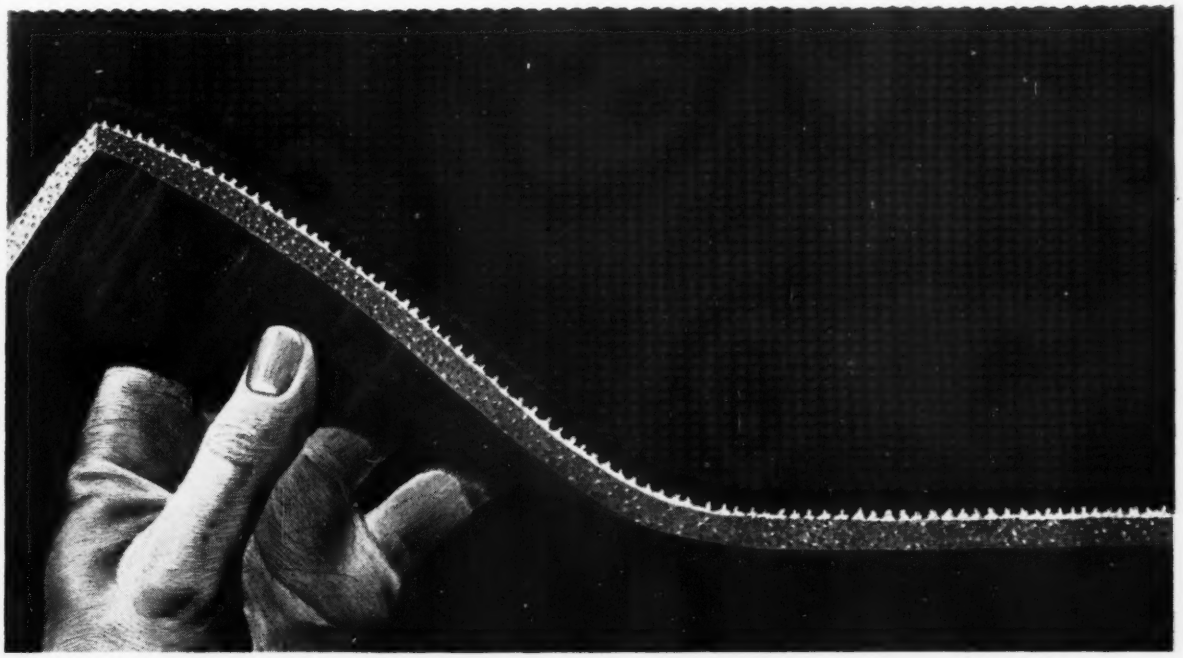

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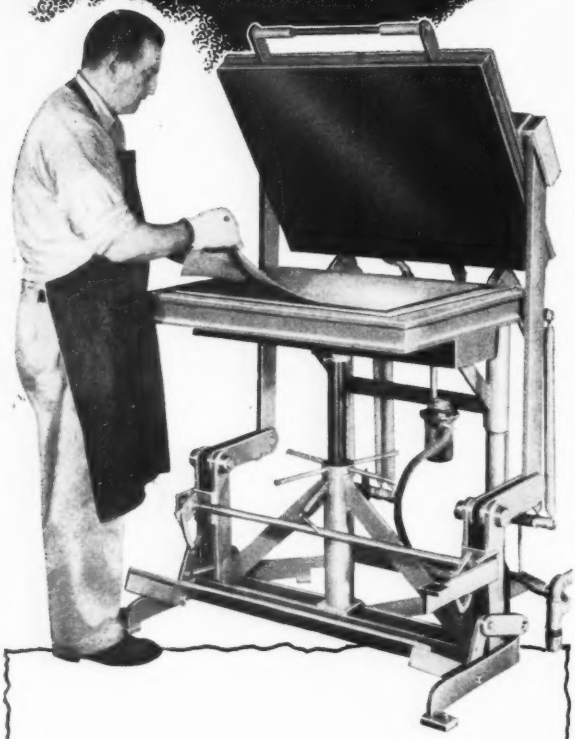

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VOL. 125—NO. 5 FEBRUARY, 1952

A New Rotary Seal for High-Speed and High-Pressure Applications[1]

T. J. McCuistion[2]

HERETOFORE engineers who were specialists in the use of rubber "O" rings had never considered it possible to use the "O" ring in a seal for a rotating shaft except at very slow rates of motion. The engineering staff of Precision Rubber Products Corp. concurred in this opinion until recently. Now we believe that the fundamental factors which previously made such applications impractical have been discovered and analyzed. Tests of experimental designs and actual experience with working applications embodying the correct principles now make it appear not only possible but practical to use the "O" ring for a variety of rotating shaft seals. Experience indicates that these seals will work at relatively high shaft speeds, and the further extraordinary indications of this early experience are that these seals will also work at pressures considerably higher than those common for conventional lip-type or diaphragm seals.

The use of "O" rings as static and reciprocating seals is a well-developed and familiar engineering practice; therefore, for the safe of brevity, the term R"O"TO seal will be used in this paper to describe the use of the "O" ring for sealing rotary motion. The general term, rubber, is used to describe both synthetic and natural elastomeric materials.

Our work to date has dealt primarily with the use of the "O" ring as the sealing element against oil. The further development of this new sealing method, however, is by no means solely limited to such applications. Before proceeding further, it is only fair to point out that patents are pending and/or issued on designs using many of the disclosures in this paper.

Development work has been concentrated around the "O" ring type of design because of its simplicity and the wide variety of standard sizes of these rings available. In many cases it should be possible to use standard ring sizes, but special compounds will be required for certain applications where rubber having special characteristics is necessary.

[1]Presented before the Rubber & Plastics Division, ASME, Atlantic City, N. J., Nov. 27, 1951.
[2]Precision Rubber Products Corp., Dayton, O.

The Theory of "O" Ring Rotary Sealing Applications

The Joule effect in rubber has seldom been considered as an important engineering tool. This phenomenon, however, offers the nearest approach to an explanation of the fundamental principle which contributes to the success or failure of any design which incorporates the "O" ring in a rotating shaft sealing application. In fact, it may also account for many of the inconsistent failures of conventional oil seals in use today.

The Joule effect can be illustrated by quickly stretching a rubber band and touching it to one's lip. The rubber band will be warm. If the band is then allowed to contract, it will feel cool. By the same token, if heat is applied to most types of rubber in a relaxed condition, they will contract slightly if not held rigidly in place. These internal forces which cause rubber to contract are intensified if the rubber member is in a stretched condition, thus producing even larger relative contraction.

The relation of the Joule effect to seal failures might be explained in the following manner. When the "O" ring is used in the usual way, the friction of the rubber against the rotating shaft generates heat. This heat causes the rubber to contract as the Joule effect comes into play. The contraction of the rubber, in turn, causes a higher unit loading of the rubber against the shaft. The cycle of friction, heat, and contraction of the rubber ring is repeated until rapid failure of the seal occurs.

If the "O" ring has peripheral tensile stresses due to the rubber being stretched over the shaft, even though everything else is in proper working order, failure will occur in a very few minutes at shaft speeds above 200 fpm. Hydraulic or air pressure added to or developed in the system, voluntarily or involuntarily, also causes higher unit loading of seals and will cause premature failures at even slower shaft speeds. The amount of tensile stress allowable, if any, for a rubber seal of any type that rubs directly on the shaft will depend upon contact area, pres-

sure, unit loading, surface finish of the shaft, and probably many other factors not yet evaluated.

Rubber is such a poor conductor of heat that when the "O" ring is used in the conventional manner on a rotating shaft, the rubber surface next to the rotating member will contract, pull itself apart, and char before the rest of the seal is affected to any great extent. If the assembly

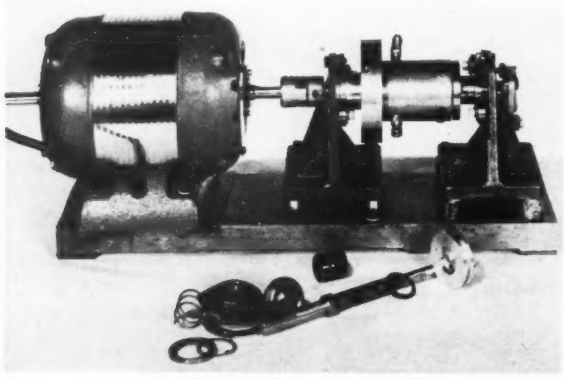


Fig. 1. Equipment Used for Developing R"O"TO Seal: Shaft Passing through Cylinder Filled with Oil Is Sealed with Diaphragm Seal and on the Other End with R"O"TO Seal; Dismantled Apparatus in Foreground

is allowed to run for more than a few minutes, the shaft will become scored and blue from the excessive heat generated. Small cracks will develop in the ring when it deteriorates under these conditions, and leakage of the contained liquid will take place.

Preliminary test results indicate that rubber in the tensile stressed condition has a higher coefficient of friction than when it is in a compressed state. This fact is especially noticeable after a few minutes of continuous operation of an "O" ring seal on a rotating shaft. The Joule effect is also believed to contribute to failures in other "O" ring applications where the working temperature varies over a wide range, such as, with cylinder liners, long stroke reciprocating units, and similar applications. Some of these failures can be prevented in the manner described for high-speed rotating shafts as described later in this paper, but time and space do not permit a complete discussion of these special cases in detail.

The Joule effect should not be confused with the temperature coefficient of linear or volumetric expansion. The coefficient of expansion of rubber is roughly ten times that of steel. When the temperature is raised, the rubber tends to swell volumetrically a small amount owing to the coefficient of expansion. The contraction of the rubber ring brought about by the Joule effect appears to make the seal want to do more work on the surface that contacts the rotating member. The coefficient of expansion should be considered when designing a unit to utilize a R"O"TO seal as well as for other high or very low temperature applications, but the effect of the expansion coefficient does not seem to be the basic cause of seal malfunction.

As a result of our investigation directed toward means of improving the use of "O" rings for seals with rapidly rotating shafts, we have found that in order to offset the Joule effect and the dimensional changes resulting from it, it is necessary to use an oversized ring in relation to the shaft. In other words, the ring should be applied under peripheral compression. Tentative indications are that relaxed rubber can contract as much as 0.015-inch

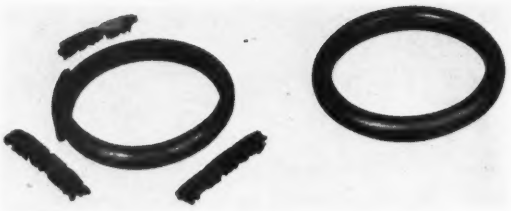


Fig. 2. Seal on Left Stretched over Shaft Failed after Four Minutes' Operation; Oversize-Diameter Seal on Right Ran 100 Hours without Failure

per linear inch, when subjected to high temperature. The amount of contraction is primarily dependent upon the particular rubber compound used. For example, a one-inch shaft would require a ring that has a relaxed I.D. of 1.045 inches in order completely to offset the Joule effect. The amount of relative oversize necessary for a particular application depends upon the degree to which the effect is reduced, which in turn is related to the temperature of operation, shaft speed, area of seal contact, and compound.

"O" ring seals, oversized in relation to the shaft, which we call R"O"TO seals, do not have a continuing heat build-up after the initial few minutes of operation. Instead the temperature curve levels off after a moderate rise. In contrast, regular-size "O" rings, when used on shafts rotating at relatively high speeds and stretched slightly around the shaft, develop heat continuously until failure occurs.

Lip-type oil seals are sometimes made to operate satisfactorily by soaking them in oil prior to use. It is believed that the lubrication is very helpful and that the slight swelling of the rubber tends to offset the Joule effect. Our experience indicates that a few thousandths of an inch variation in seal I.D. can mean the difference between success and failure in a given application. One firm stopped an epidemic of seal failures by following our suggestion of trimming a little more of the lip off the seals they were using, which, in effect, further increased the I.D. of the seal.

Experimental Details

Figure 1 shows the test equipment that was used in the initial work in the development of the R"O"TO seal. It is a simple cylinder filled with oil, and the shaft passing through the cylinder is sealed on one end with a diaphragm seal and on the other end with a R"O"TO seal. Pressure is applied by attaching a flexible hose to the fitting on top of the cylinder. The motor operated the shaft at a speed of 3450 rpm. Tests were run by allowing the shaft to turn steadily for eight hours at a time, or until failure of the seal occurred. A seal was considered to have failed when the temperature of the oil reached 290° F., as well as when leakage occurred.

The diaphragm seal was used so that friction and heat could be held to a minimum and one R"O"TO seal at a time could be tested. Other arrangements had to be made later for work at higher pressures.

The shaft was so constructed that it would accommodate various sized collars, since it was much easier to vary the size of the housing and the shaft by means of these collars than to make a new rubber mold for each relative I.D./O.D. size of ring needed. Fittings were installed on each side of the cylinder to accommodate a thermocouple and a pressure line to the hand pump. A 3450-rpm., ½-hp. motor was used to drive the unit.

Several of our customers cooperated with us in this development program, and we wish to take this occasion

to express our sincere thanks to their worthwhile contributions and splendid assistance, without which the program might have been doomed to failure.

Design Considerations

Peripheral Compression

Figure 2 shows two R"O"TO seals that were tested under almost identical conditions. The test conditions are given below:

Oil temperature at start of tests	60° F.
Seal compound in both cases	Same
Cross-section—both, in.	0.139
Shaft speed—both cases	Same
Diameter—both cases, in.	0.998
Groove length—both cases	Same
Squeeze—both cases	5% of cross-section
Oil	Same
Seal A: I.D., in.	0.984
B: I.D., in.	1.044

The variable in the two tests was that "O" ring A was stretched over the shaft and "O" ring B had an I.D. about 0.046-inch larger than the shaft diameter prior to installation. A little more cross-sectional squeeze was created on seal B owing to the "fattening" of the ring when peripherally compressed into the groove. Ordinarily one would think that this peripheral compression would have increased the tendency of the seal to fail, but such was not the case.

Seal A was considered to have failed after four minutes of operation. At that time the oil temperature had reached 295° F. and was climbing rapidly. Seal B caused the oil temperature to rise to 152° F., at which point the temperature leveled off. The test of seal B was allowed to run for about 100 hours before being discontinued, without any sign of leakage or other malfunction. Other R"O"TO seals have been tested under similar conditions up to 4,000 hours without failure.

Cross-Sectional Squeeze

The proper amount of squeeze to be applied to R"O"TO seals in applications on rotating shafts has to be determined by compromise. On one hand, it is desirable to have only enough squeeze to make the seal contact the shaft since the unit load on the seal and the area of contact with the shaft should be kept to a minimum. High unit loading causes unnecessary friction, and the larger the contact area the greater the cooling problem. On the other hand, more than bare contact is needed to offset the effects of the coefficient of expansion and compression set of the rubber and shaft eccentricity or wobble.

A cross-sectional squeeze of from 2-5% is considered a good balance for most R"O"TO seal applications when "O" rings with a cross-section up to 0.139-inch are used. Usually no allowance need be made for the "fattening" effect of peripheral compression if the shaft speed does not exceed 700 to 1,000 fpm.

Shaft Surface Finish and Hardness

A ground metal surface shaft finish from 5 to 25 micro-inches appears to be the best from the results of preliminary tests. If the metal surface is too smooth, the seal will not be lubricated properly and will overheat in the same manner as though the seal had been stretched around the shaft. If the surface is too rough, the seal will wear excessively. The higher the speed and or temperature of operation, the more critical the finish and the per cent. squeeze requirements.

Most of the laboratory tests and field applications to date have been with a shaft with a hardness of 55±5 Rockwell C with good results. Other metal hardness may be just as desirable or even better for R"O"TO seal applications. Much more study is needed in order to determine the effects of metal hardness and of different metals on this type of seal.

Groove Length

Tests thus far seem to indicate that the groove length, "F" dimension, as shown in Figure 3, should be about the same as or a little less than the "O" ring cross-section after assembly. If the groove is too wide, there is a tendency for the seal to snake and sometimes even rotate in the groove. A wide groove makes it easier, however, to assemble the R"O"TO seal. A rather narrow groove may be desirable in some installations so that side squeeze is applied to the R"O"TO seal. The narrow groove prevents the seal from rotating and decreases the tendency of the seal to take an excessive compression set. The following relation is recommended as a starting point:

R"O"TO Seal Groove Length="O" Ring-Cross Section + 2 to 5%

The combination of cross-sectional squeeze and peripheral squeeze causes a slight side squeeze on the seal when the above formula is used.

Compound Characteristics

Proper compound characteristics for R"O"TO seals are of major importance. A good compound in the proper design will last thousands of hours; while a poor compound will last only a few minutes on the same application, even though the design is correct. The important characteristics that have to be considered and carefully controlled in a compound for R"O"TO seals are as follows: heat resistance; modulus; hardness, hysteresis, and stress relaxation; compression set; and oil resistance. With the finished moldings the dimensional tolerances must be held to narrow limits.

Strict quality control and good factory housekeeping are essential if all of these factors are to be kept in the proper balance.

From the engineer's standpoint each compound should be approved before use by testing it in the particular application for which it is intended. Functional testing will usually tell quickly whether or not a compound has the necessary qualities such as heat resistance, hysteresis, etc. Oil resistance, hardness, and tolerances are the primary items to check for production control after a particular compound has been proved by functional test.

High modulus compounds in the 80 to 90 Shore A durometer hardness class are needed for most R"O"TO seal applications. Softer, high elongation compounds apparently tend to be pulled or stretched by the friction of the rotating shaft. The more the seal is pulled around by the shaft, the greater the stretch of the rubber at the shaft surface. This stretching results in still higher friction and more of a tendency for the rubber to overheat and pull itself apart because of the Joule effect. Therefore the higher the speed of operation, the higher the modulus and hardness needed in the compound for use under such conditions. On the other hand harder, high modulus stocks tend to exert more of a load on the seal, when the same relative squeeze is used, and create higher starting friction.

The proper hysteresis and recovery characteristics are most important factors in selecting a R"O"TO seal compound. The rubber must have the proper snap or resiliency in order that the seal will make the necessary quick recovery and remain in contact with the rotating member at all times. The higher the speed of the shaft and the higher the temperature developed, the more critical this factor of resiliency becomes, and only one

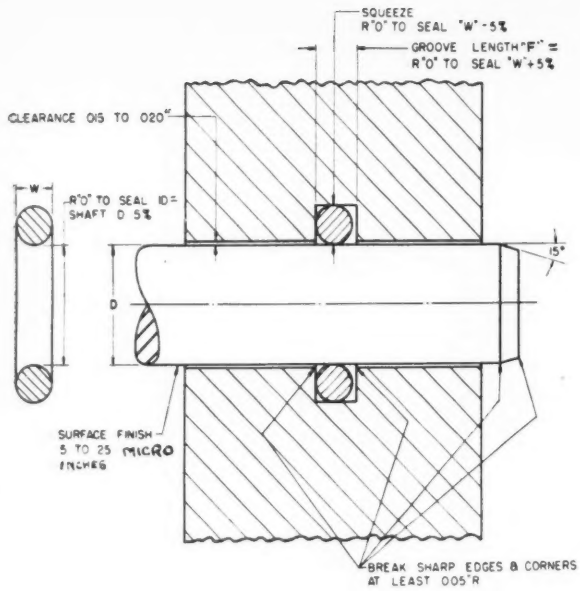


Fig. 3. R"O"TO Seal Installation Showing Details of Proper Groove Length, Seal Diameter, Squeeze, Etc.

Seal Assembly

It is necessary to round the corners of the shaft over which the R"O"TO seal must pass during assembly. A minimum radius of 0.005-inch of the end of the shaft can be tolerated in most cases, but a larger radius is helpful and desirable. This rounded shaft end prevents the seal from being cut by otherwise sharp edges during assembly and also allows the seal to retain its prelubrication.

Lubrication, prior to assembly, is vital for the "breakin" of the R"O"TO seal. Without this lubrication, high-speed applications may perform erratically. Grease has proved superior to the various oils tested to date. One user of these seals has found a graphite grease that satisfies his requirements. We have found that a barium grease is satisfactory also, but we cannot make definite recommendations at this time because we feel that more study is needed on this phase of the R"O"TO seal program.

Seal Operation

Before the decision is made to try a R"O"TO seal for a given job, it is necessary to analyze the application carefully. For example, if the rotational speed is the same in both cases, a hydraulic pump seal can be operated at slightly higher temperature than a shaft bearing seal, since apparently there is more efficient cooling of the gland in the case of the pump application.

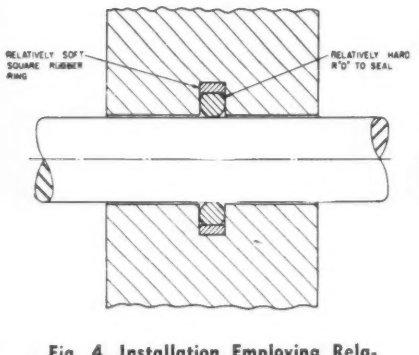


Fig. 4. Installation Employing Relatively Hard R"O"TO Seal and Relatively Soft Square Rubber Ring

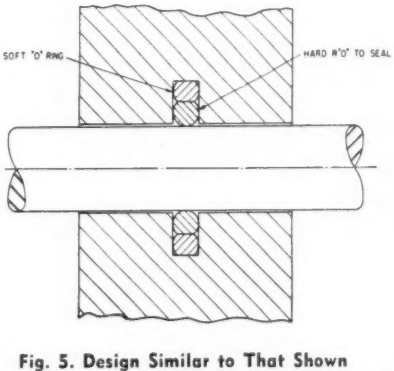


Fig. 5. Design Similar to That Shown in Figure 4 Except Two "O" Rings Are Used

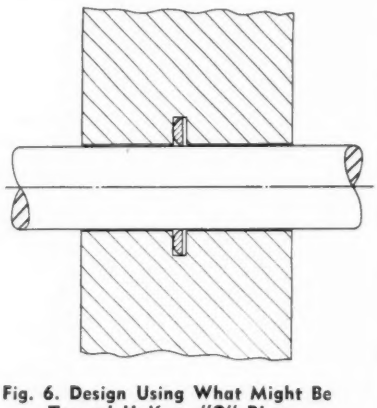


Fig. 6. Design Using What Might Be Termed Half an "O" Ring

or two types of rubber polymers have been found satisfactory thus far for R"O"TO seal application.

Fairly low compression set is important, but can easily be overemphasized. A compromise seems necessary in order to give the proper resilience and hysteresis characteristics. Some compounds that have superior compression set characteristics will leak badly when used for R"O"TO seals. Unfortunately failure due to this cause may not show up until the unit has been assembled for a month or two.

Testing for oil resistance, i.e., swell in ASTM #1 and #3 oil, is one of the best production control tests, if conducted properly. The seals should also be tested in the oil in which they are to be used commercially, since excessive swell cannot be tolerated. A good indication of how much volumetric swell can be permitted in a given design will be found by comparing the cross-sectional area of the groove to the cross-sectional area of the seal. The groove area should be greater than the "O" ring cross-section plus swell.

Considerable progress has been made in compound development by the Precision Rubber Products Corp. laboratory since the start of the R"O"TO seal program. As more and more performance data are obtained, it is reasonable to assume that much better R"O"TO seal compounds can be developed.

The following examples of R"O"TO seal applications are given to provide an indication of current trends:

1. One firm is using the seal successfully at intermittent pressures as high as 1000 psi. in connection with a shaft operating at 520 fpm.

2. Another firm has been able to seal at room temperature for 300 hours a ¾-inch bearing shaft turning at 9000 rpm. With temperatures ranging between —65 and + 250° F., however, satisfactory sealing was not obtained, but efforts are being continued to solve this problem.

3. Another company has been successful in sealing a ⅝-inch shaft on farm equipment which operates at 4000 rpm. (shaft speed is approximately 640 fpm.).

Since most of the data on field tests are the property of our customers, we are not at liberty to describe many other applications now in service. Several thousand R"O"TO seals are in service at the present time, however, and no trouble has been reported with these applications to date.

(*Continued on page* 581)

"Carbowax" Compounds and Polyethylene Glycols Aid in Rubber Fabricating[1]

C. P. McClelland[2]

"CARBOWAX" compounds and polyethylene glycols are today one of our most important aids in rubber goods fabricating. The first commercial availability of these products coincides approximately with the initial large-scale production and use of styrene-butadiene synthetic rubber in 1941. In that year the total amount of synthetic rubber used in Canada and the United States was about 6,000 long tons. This consumption figure has increased to about 725,000 tons in 1951, a growth of about 1100%. During the same period the use of liquid and solid polyethylene glycols as rubber lubricants and release agents grew at about the same rate. This fact should not be interpreted as a deemphasis of the use of these products with natural rubber, but rather should point out that the processing of synthetic rubber with its low tear strength was greatly facilitated by commercial use of "Carbowax" compounds and polyethylene glycols.

Prior to 1941 the lubrication and mold release of rubber products was carried out with such materials as soap, glycerine, and sulfated and sulfonated oils. The soap and solubilized oils were different to work with, and, more important, all contained inorganic portions in their chemical molecules which would not burn away. This non-burnable portion caused a residue build-up in the molds which necessitated frequent clean-up periods with a consequent loss in production. Glycerine, while water-soluble and wholly organic in its chemical molecule, is volatile, and its use results in excessive losses during rubber processing. In addition, glycerine lacks sufficient lubricating action for most molding operations.

Physical and Chemical Properties

Before describing the many uses of "Carbowax" compounds and polyethylene glycols in the rubber industry, a brief discussion of their chemical nature and physical properties may be helpful. These products are a series of water-soluble, non-volatile, liquid and solid lubricants. Chemically they are polymers of ethylene oxide, but the several members of the series differ from each other in average molecular weight. This difference in molecular weight affects many of the physical properties of the individual products. They are named according to their molecular weight, with the exception of "Carbowax" compound 1500, which is a blend of the 300 and 1540 compounds. The liquid products are polyethylene glycols 200, 300, 400, and 600. The solid materials, sold under the trade mark "Carbowax," are compounds 1000, 1500, 1540, 4000, and 6000. All of these products are easy to store and handle. The liquids are relatively low in viscosity and are shipped in drums and tank cars. The softer solids are shipped in open head drums or polyethylene-lined paper cartons, and the flaked solids in waterproof bags. Of these nine materials, the principal ones of interest to the rubber goods fabricator are polyethylene glycol 400 and "Carbowax" compounds 1500 and 4000. The physical properties of the most interest to the rubber industry are listed in the accompanying table.

All of the products are very low in inorganic ash, being controlled by specification to less than 0.1 or 0.2%. When used as rubber lubricants, these products leave no unburnable residue to build up in the molds. The high flash points of over 400° F. are also well above the temperatures generally encountered in rubber goods fabricating. The high water solubility of these products insures ease of application and of removal from the mold surface when desired.

The last two properties listed in the table, hygroscopicity and evaporation loss, are given relative to glycerine, a familiar product in industry. The liquid and solid polyethylene glycols are substantially less hygroscopic than glycerine which minimizes any chance of steam pockets being formed during the hot processing of the rubber. Polyethylene glycols 200, 300, and 400 are approximately half as volatile as glycerine at tem-

[1] Presented before the Kitchener Rubber Group, Wellington-Waterloo Section, Chemical Institute of Canada, Jan. 15, 1952.

[2] Carbide & Carbon Chemicals Co., Division of Union Carbide & Carbon Corp., New York, N. Y.

PHYSICAL PROPERTIES OF THE POLYETHYLENE GLYCOLS AND "CARBOWAX" COMPOUNDS

Product	Physical Form	Freezing Point, °F.	Saybolt Viscosity of Liquids at 70° F.	Specification Ash Content % by Wt.	Flash Point, °F. (Cleveland Open Cup)	Water Solubility at 68° F., % by Wt.	Comparative Hygroscopicity 68° F., 70%R.H (Glycerol = 100)	Comparative Evaporation Loss at 300° F. (Glycerol = 100) Min. 20	Min. 80
Polyethylene glycol 200	water-white liquid	super-cools	290	<0.1	>325	complete	70	52	55
300	water-white liquid	5–46	390	<0.1	>375	complete	60	28	45
400	water-white liquid	39–50	560	<0.1	>425	complete	55	28	41
600	water-white liquid	68–77	semi-solid	<0.1	>450	complete	40	non-volatile	
"Carbowax" Compound									
1000	white, hard solid	98–104	solid	<0.1	>450	approx. 70	35	non-volatile	
1500	white, soft solid	100–106	solid	<0.1	>425	approx. 73	35	non-volatile	
1540	white, hard solid	109–115	solid	<0.1	>450	approx. 70	30	non-volatile	
4000	white, hard flakes	127–133	solid	<0.2	>475	approx. 62	non-hygroscopic	non-volatile	
6000	white, hard flakes	140–146	solid	<0.2	>475	approx. 50	non-hygroscopic	non-volatile	

peratures of 300° F. This difference can be made still greater, if desired, by incorporating a small amount of antioxidant such as hydroquinone monomethyl ether in the polyethylene glycol. The low volability of these compounds is particularly important in the lubrication of tire curing bags where losses can occur from the hot bag surface during the return cycle from the curing molds.

Applications

The applications of the liquid and solid polyethylene glycols in rubber goods fabricating are of four general types—mold release of mechanical goods, mold release of foam rubber, lubrication of tire airbags, and lubrication of products made from latices. "Carbowax" compound 4000 and sometimes compound 6000 are the choice for mold release; polyethylene glycol 400 and sometimes 300 for tire airbag lubrication; while "Carbowax" compound 1500 works best in the lubrication of latex products.

All types of rubber have been successfully lubricated with these polyethylene glycols. No adverse effect has ever been reported.

Mechanical Goods Molding

Mechanical goods, such as shoe soles and heels, radiator hose, battery cases, hydraulic brake cups, rubber mats, and many other products, are regularly molded with "Carbowax" compounds 4000 and 6000 as the lubricant. The general practice in utilizing these compounds is to spray or brush on the molds a water solution containing from 0.5 to 5% by weight of the compound. Usually this application will last through a number of molding cycles. Both the concentration of "Carbowax" compound used and the frequency with which the lubricant must be applied depend on the composition of the rubber compound, the temperature of the cure, and the method of application. Large amounts of some of the fillers employed in rubber compounds will increase the quantity of lubricant required by absorbing excessive amounts of the lubricant solution. Calcium carbonate is reported to be objectionable in this respect. Manual brushing of the lubricant on the mold, while often most convenient, tends to give uneven application of the lubricant so that spraying is generally preferred. "Carbowax" compound 6000 has slightly better lubricating properties than the 4000 compound and is preferred when the demands on the lubricant are severe, as in the molding of hard rubber battery cases.

Foam Rubber Molding

The large-scale use of foam rubber in making mattresses, pillows, cushions, automobile seats, and many other articles is now a large operation in the rubber industry. "Carbowax" compound 4000 is the most widely used release agent for the molding of such foam rubber articles because of its excellent release properties, solid form, and negligible effect on the foam itself. Most other types of lubricants either break the foam structure or tend to be washed off the mold surface when the foamed latex is poured into the mold.

Compound 4000 is sprayed on the molds either in aqueous solution or in a solution of about 90% isopropanol and 10% water. Generally 5% to 20% by weight of the compound is dissolved in these solutions, and sometimes a small amount of clay or talc is added. After the solution has been sprayed on the mold, it is either dried with applied heat or allowed to dry by evaporation

Fig. 1. Examples of Some Polyethylene Glycols and "Carbowax" Compounds

at room temperature. The lubricant is then present as a solid film when the foamed latex is poured. The choice of isopropanol or water depends on the drying time available for the molds after the lubricant solution is applied. Water is preferred, but if the time cycle is short, isopropanol should be used to obtain faster drying. The concentration of compound 4000 used is governed largely by the intricacy of the mold and the depth of the inserts. Less lubricant is required with natural rubber than with butadiene-styrene rubber.

Lubrication of Tire Airbags

A good airbag lubricant should be water soluble, nonvolatile, non-irritating to the human skin, and should impart slip to the rubber and promote long airbag life. Polyethylene glycol 400 is outstanding in meeting all of these requirements. Its low volatility is particularly important where the processing of tires is rapid so that the airbags remain hot throughout the whole cycle of operations. Under such conditions the use of the 400 compound can reduce the amount of lubricant needed by from 20 to 40%. The wide acceptance of the polyethylene glycols and "Carbowax" compounds in pharmaceutical ointments is indicative of their bland effect on the skin.

Plant experience has indicated that the use of the 400 compound is accompanied by satisfactory airbag life. Formulae for airbag lubricants vary widely and are usually different for every plant of the many companies making tires. As a starting point, the following general formula for a polyethylene glycol 400 lubricant solution is offered: polyethylene glycol 400 by weight, 10-30%; mica, by weight, 10-30%; and, 60-80% water. Sometimes the addition of about 0.1% of soap is desirable.

Latex Products Lubrication

"Carbowax" compound 1500 is being used as a lubricant for products made from latices other than foam rubber. The 1500 compound serves as a lubricant in coating latex on textile fabrics and also functions as a parting agent for latex dipped gloves. In these applications, about 2% to 5% by weight of compound 1500 is generally mixed into the latex compound.

Miscellaneous Applications

Because of the familiarity of rubber processors with these polyethylene glycols it is natural that other applications for them have developed in the rubber industry. "Carbowax" compound 1500 is finding wide-

spread use in the recapping of white sidewall tires. This paste-like material is spread over the white sidewall and prevents yellowing during the curing operation; after which it then can be easily washed off with water.

United States Rubber Co.

Fig. 2. Foam Rubber Automobile Seat Cover Being Removed from Mold with Aid of "Carbowax" Compound as Release Agent

Compound 1000 has found application as a heat transfer medium in vulcanizing equipment; while compound 4000, applied as a 1% solution containing 0.1% of "Tergitol" wetting agent 7 to improve spreading, forms an excellent temporary anti-static coating for many rubber products such as belts. Compound 6000 solutions are used when hard rubber is machined, and polyethylene glycol 400 is suggested as a part of the coagulant bath in connection with the manufacture of latex coated fibers.

Other New Rubber Chemicals

The polypropylene glycols are now commercially available in three different molecular weight ranges: namely, 425, 1025, and 2025, all of which are liquids. The 425 compound is water soluble; while the others are insoluble in water. These products are somewhat better lubricants and are more soluble in hydrocarbon solvents than the polyethylene glycols; yet they have no adverse action of rubber.

"Ucon" brand fluids are chemically related to both polyethylene and polypropylene glycols. They are available in a wide variety of types—both water soluble and water insoluble. Together with the polypropylene glycols the "Ucon" fluids are useful in lubricating rubber, particularly where pressure is exerted on rubber-to-metal surfaces.

A new surface active compound, marketed as "Tergitol" XC, is also chemically related to the polyethylene glycols and polypropylene glycols. This product is a good detergent and emulsifier and should be a good rubber lubricant. It is presently available in semi-commercial quantities, and most of its uses have yet to be explored. This material should have excellent possibilities as a tire tread lubricant, a suspending agent for inert solids, and possibly, also, as an emulsifier for use with rubber latices.

The terms "Carbowax," "Tergitol," and "Ucon" are registered trade marks of Union Carbide & Carbon Corp.

Rotary Seal

(*Continued from page 578*)

Future Plans

From the beginning of the R"O"TO seal program it has been the objective to make and keep the seal and its installation as simple and inexpensive as possible. The overall cost of the R"O"TO seal is considerably less than that of other oil or mechanical seals that will do the same job. Companies now using the R"O"TO seal have stated that their savings amount to as much as 80%.

Progress to date indicates that it is possible to provide a satisfactory seal for many applications with just an "O" ring in a groove. A number of applications are outside the speed and temperature range limits of the single seal, however, and further investigation with more complicated designs is planned. The objective will still be to keep the new designs as inexpensive, simple in construction, and as easy to assemble as possible.

Figures 4, 5, and 6 show three designs under consideration. The objective in each case has been to decrease the unit load on the seal without having to reduce the modulus or hardness of the rubber element rubbing against the shaft.

Figure 4 shows a square cross-sectional ring made of relatively soft rubber pushing the harder oversized "O" ring against the shaft. In this design the unit load is reduced; the better compression set characteristic of the soft rubber ring is realized, and the friction against the shaft is less because of the harder rubber ring used at that point.

The design shown in Figure 5 is based on the same principles as that of Figure 4; the only difference is the use of two "O" rings instead of one square cross-section ring and one "O" ring.

Figure 6 illustrates what might be termed as half an "O" ring. In this design, in addition to having a reduced surface area rubbing on the shaft, the unit loading of the seal is distributed through more relative depth. In each case the effect is that of using a lower rate spring.

A large number of possible designs would employ combinations of rubber and metallic springs. We believe, therefore, that we have just scratched the surface in the development of a new rotary seal for high-speed and high-pressure applications.

NRB Opens New Laboratory

The new Natural Rubber Bureau research laboratory in Rosslyn, Va., just across the Potomac from Washington, D. C., was viewed January 15 by more than 100 persons from government, industry, and the press.

Warren S. Lockwood, director of the Bureau, and his associate, H. C. Bugbee, explained the new laboratory would devote most of its efforts to determining fully the advantages accruing from adding rubber to asphalt for highway use. In carrying out this objective, tests will be made with every type of rubber (natural, reclaimed, synthetic, etc.) in every possible form.

The laboratory is under the professional engineering direction of Harry K. Fisher, NRB rubber road consultant. Its staff includes graduate engineers, chemists, and technicians, with highway research and practical experience obtained in many state and city departments.

Further details of the laboratory's equipment and work will appear in a future issue.

The Library of the Division of Rubber Chemistry, A. C. S.

Ralph F. Wolf[1]

WHAT did C. O. Weber conclude about the use of oleic acid in rubber in 1904?

How much trinitrobenzene did Ostromislenski use in vulcanizing rubber without sulfur in 1915? Is there available a bibliography of other references to non-sulfur vulcanization?

Where can a list be obtained of references about work done on "O" rings since the end of the war?

How was rubber soling compounded in the 1930's before high styrene copolymer resins were manufactured?

Where can a copy be obtained of a reference in a foreign journal such as *Revue Générale du Caoutchouc* or *Kautschuk und Gummi,* or possibly a lesser known publication such as *The Australian Plastics Journal*?

Difficult questions? Not for anyone who belongs to the Division of Rubber Chemistry of the American Chemical Society. Every member of that organization has, in effect, the world's largest library of technical and historical information about the rubber industry and its technology as close to him as the nearest telephone or mailbox.

Many members of the Rubber Division themselves do not yet know what a wealth of information and what a variety of services are available to them as a result of the activities of their library committee and the Rubber Library which the Division operates at the University of Akron in Akron, O.

Rubber Division members should realize that they now have access to a Rubber Library which approaches the two requisites of any good technical library. First, it has at hand, or is collecting, all significant literature dealing with rubber chemistry and technology; and, second, it is making this information readily available to those who need it.

The Division's library committee wants to emphasize the second point particularly. Individual members, especially those in small companies, located at a distance from the major rubber manufacturing centers or out of range of any of the local rubber groups, may feel that the Rubber Library can only be used by the big companies or by those individuals who are able to visit it in person.

Such is not the case at all, and Benjamin S. Garvey, Jr., Sharples Chemicals, Inc., chairman of the library committee, emphatically expresses the hope that the small company technical man who has no library facilities at his command will consider the Division library his own and make use of it to the fullest extent.

How to Use the Rubber Division Library

The process by which any member, even the most isolated one, obtains information from the Rubber Library is quite simple. A union list of all the journals and periodicals which are available through the Rubber Library will be sent within a short time to every member of the Division with the exception of those employed in the four major rubber companies in Akron. A similar union list of the books that are available will also be sent to the same members in the near future. The lists are also on file in the public libraries of most of the larger cities, particularly in rubber manufacturing areas. Librarians in smaller towns who do not receive the lists can obtain them by making request to the Rubber Library. Any accredited library can obtain any item on these lists.

The Division member merely visits his local library, makes known his wants, and the library in his own community then obtains the desired material from the Rubber Library on an inter-library loan. The material is returned through the local library also. Once known in the library in his own community, the member of the Rubber Division will probably find that he can borrow material by simply calling his local librarian or mailing in his request.

Failure of the Division's membership to realize how easy it is to obtain material from the Rubber Library has been due to lack of information, and this has been in part, intentional. The ability to furnish such service demands the service of a full-time librarian. Until comparatively recently, lack of funds to hire the necessary personnel severely limited the amount of service that could be rendered, and as long as this condition existed, it was unwise to publicize what the Library hoped to be able to do in the future. This condition was remedied last year by the appointment of a librarian who has been working full time since last fall. The librarian is Miss Betty Jo Clinebell,[2] a University of Akron chemistry graduate, who worked previously in the science and technology division of the University's Bierce Library.

Now that both material and personnel to handle the activities of the Rubber Library are available, officers of the Division hope that the membership will take full advantage of the new service which, obviously, can be of great value.

The Development of the Rubber Library Idea

The idea of a Division sponsored library was first proposed to the executive committee during the fall meeting in Chicago, Ill., in 1946. At that time the finance committee, through its chairman, R. P. Dinsmore, Goodyear Tire & Rubber Co., recommended the establishment of a rubber library at the University of Akron. Among other things it was proposed that, in addition to all books, periodicals, and reports provided by the Division, this library should also contain all records of synthetic rubber research made available by the government as well as reports of the technical rubber missions that visited Germany at the end of World War II.

The executive committee felt that the proposal should be given further study and appointed Dr. Garvey, chairman of the library committee, which was charged with developing a specific plan. Dr. Garvey has continued

[1] Columbia-Southern Chemical Corp., Barberton, O. Also a member of the library committee, Division of Rubber Chemistry, A. C. S.

[2] India RUBBER WORLD, Aug., 1951, p. 587.

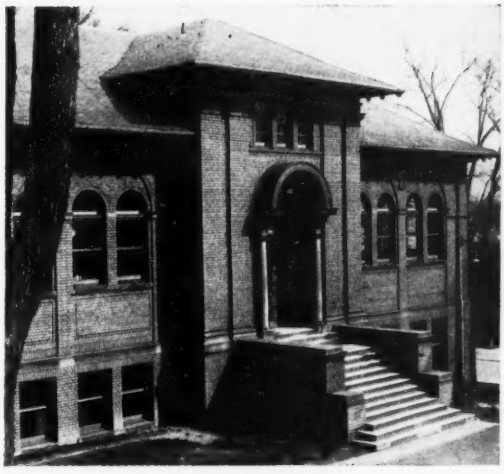


Fig. 1. Original Bierce Library at the University of Akron

to head the committee ever since, and the Division owes him a great debt for having developed the Rubber Library to the actuality it is today.

The original library committee consisted of H. C. Tingey, United States Rubber Co.; Harry N. Stevens, B. F. Goodrich Co.; Miss Leora Straka, Goodyear; Miss Dorothy Hamlen, University of Akron; Miss Phyllis Hamilton, Firestone Tire & Rubber Co.; Frank Kovacs, Seiberling Rubber Co.; and Ralph Appleby, E. I. Du Pont de Nemours & Co., Inc. Miss Hamilton, Mr. Appleby, and Mr. Kovacs are no longer active on the committee. Miss Lois Brock, General Tire & Rubber Co.; Miss Fern Bloom, Goodrich; Miss Dorris Hall, Firestone; and H. E. Simmons, University of Akron, were added to the original group, and still later, Ralph F. Wolf.

The early proposal to collect, sort, and make available in useful form the complete story of the wartime development of synthetic rubber was thoroughly studied and dropped for several reasons. Collating and editing the vast mass of material available would have been a monumental task from the standpoints of both time and money required. The security classification of many of the documents would have added further complications. In the meantime a decision of the Division to sponsor a monograph on synthetic rubber obviated much of the need of the project.

Even before the idea of a Division sponsored library had ever been broached, the several industrial libraries in Akron had found it mutually advantageous to pool their resources and trade published technical information. An informal sort of union list existed to aid this interchange. The library committee suggested first that the Division sponsor the expansion and publication of this informal union list.

In the fall of 1947, the executive committee of the Rubber Division received a recommendation from a subcommittee consisting of E. B. Babcock, Firestone; C. W. Christensen, Monsanto Chemical Co.; H. E. Fritz, Goodrich; C. P. Hall, C. P. Hall Co.; and Dr. Dinsmore, that the Division sponsor the development at the University of Akron of a comprehensive central library of rubber technology. As a first step in this development, it was suggested that the Division support the compiling of a union list of serials which would be available through the Bierce Library of the University.

This list was prepared, and the initial list, made available in 1948, included all of the holdings of Firestone, General Tire, Goodrich, Goodyear, U. S. Rubber, and University of Akron libraries. Later, du Pont and Glenn L. Martin Co. joined in the undertaking.

In operation, any journal on the list can be obtained from and returned to any accredited library. An individual borrows from his local library which in turn gets the desired item from the library at the University of Akron on an inter-library loan. If it is not on the shelves at the University, it is obtained from one of the cooperating libraries. In other words, the collection is not all in one place, but it is all available through the library of the University of Akron.

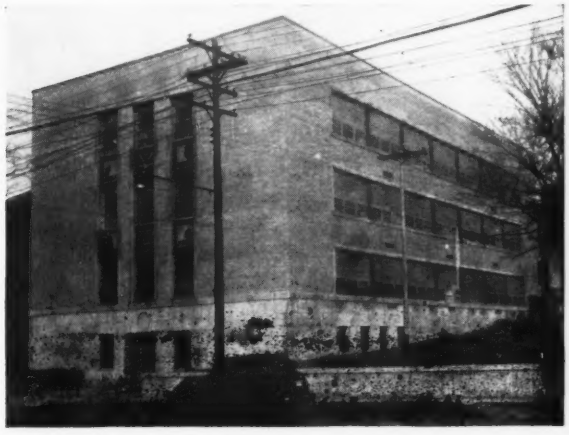


Fig. 2. Addition to the Bierce Library

When this master list of the holdings of the various cooperating libraries was completed, many gaps were revealed in files of some journals, particularly the foreign ones. In order to remedy this situation the Division has made annual grants, and missing journals have been acquired whenever they could be found.

A logical second step was the compilation of a similar union list of books available in the cooperating libraries, and this was issued in November, 1949. The Division librarian plans the annual revision of the union lists of both books and periodicals.

Other Rubber Library Projects

Another project which was among the first activities proposed for the library committee was the preparation of special bibliographies on subjects that might be of widespread interest to the membership of the Rubber Division. It was found impossible to do this until a regular librarian was employed. Shortly after this step was taken the first such bibliography—"A Survey on the Use of Rubber in Bituminous Pavements" by Miss Clinebell and Miss Straka—appeared in the October, 1951, issue of *Rubber Age*. A number of similar surveys are planned, the subjects including foam rubber, rubber base paints, and rubber to metal adhesion. Members of the Division have been asked to suggest subjects for other surveys. These suggestions should be sent to Miss Clinebell, Rubber Library, University of Akron.

In addition to handling inter-library loans and the preparation of the union lists and special bibliographies, the library committee and the Division librarian are currently engaged in several other activities.

One of these is the compiling jointly with the Division treasurer, of a membership directory for the Division, a task which in the past has been handled by the Division secretary. Other duties include keeping a running bibliography of the rubber literature since June, 1951;

maintaining a file of newspaper clippings concerning rubber and plastics; answering requests for specific bibliographies and technical literature questions; preparing a card file of trade names used in the rubber and plastics industries; and assembling statistics on production and consumption of rubber and rubber chemicals.

A number of other projects have been proposed from time to time, but have either been dropped or postponed for various reasons. Preparation of a glossary of rubber terms was considered, but not undertaken when it was found that a subcommittee of Committee D-11 of the American Society for Testing Materials under Harry L. Fisher, National Research Council, was already working on this project. Establishment of a translation service was discussed, and the idea abandoned.

Future Plans

The library committee envisions a steadily increasing usefulness of the Rubber Library to the Division in the future. Many projects in connection with rubber literature research have needed doing for a long time, but have languished because no group was available to handle them. For example, an unfilled bibliographical gap of 13 years exists between 1922, the last year covered in Bedford and Winkelmann's "Systematic Survey of Rubber Chemistry" and 1935, the first year covered by the "Bibliography of Rubber Literature" which was first published by *Rubber Age*, but was later taken over by the Division's bibliography committee. The services of the Rubber Library have been offered to the bibliography committee, incidentally, and it is expected that these will be used to an increasing extent.

Consideration has also been given and is still being given to methods whereby the Library could cooperate effectively with the editorial staffs of the A. C. S. publication, *Rubber Chemistry and Technology* and *Chemical Abstracts*. This cooperation may well prove to be one of its most important functions at some time in the future.

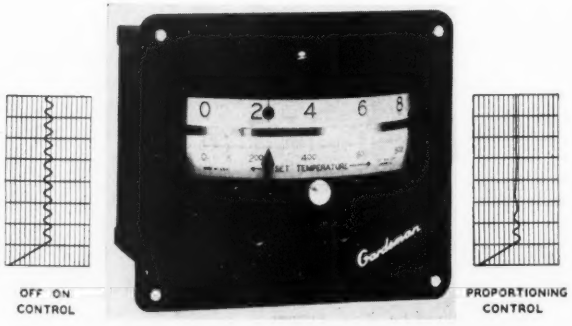
Operation of the Rubber Library has been carried on at almost no expense to the Division. Expenses were negligible until a librarian was employed. This step was not attempted until a donation of $5,000 was received from The Rubber Manufacturers Association, Inc., early in 1951. A proposal made by the University of Akron in 1950 to share equally the cost of a librarian with the Rubber Division fell through when the executive committee of the Division voted against allocation of any money for this purpose. In addition to the RMA gift, substantial donations have also been received from various supplier companies. At present, continuation of the Rubber Library is apparently contingent upon the continued generosity of the RMA and supplier companies to the rubber industry.

Deco-Blok Textured Plastic Tile with Striated Surface

Striated Plastic Wall Tile

DECO-BLOK TEXTURE TILE, a new striated plastic wall tile available in a wide variety of colors, has opened new decorative possibilities to architects and builders. Made by Plastics Engineering, Inc., Cleveland, O., the tile is designed for use in business and civic institutions where beauty must blend with practicality. Molded of Lystrex polystyrene plastic, a product of Monsanto Chemical Co., Deco-Blok breaks with the tradition of smooth surfaced tile. The surface of the new tile is heavily ribbed with parallel grooves which give a three-dimensional textured effect hitherto obtainable only with costly wood paneling. The large nine-inch square tiles also mark a departure from conventional design by having more than four times the area of standard kitchen and bathroom tile.

The new tile can be quickly and economically applied to ceilings and walls by means of a tight binding mastic. To highlight the texture look, Deco-Blok is generally applied so that the striations of adjoining tiles are at right angles. The tiles are currently available in 12 molded-in colors ranging from deep tones to muted pastels. In addition, the tiles are resistant to scratching, scuffing, greases, and oils.



Model JP Gardsman Proportioning Temperature Controller. Graphs Show *(Left)* Oscillating Temperature Control Given by Standard Off-On Controller, and *(Right)* Smooth Temperature Control Given by the Model JP Gardsman Proportioning Controller

Pyrometric Controller

A PROPORTIONING indicating pyrometric controller in the same price range as regular off-on indicating controllers is now being manufactured by Taco West Corp., Chicago, Ill. Designated the Model JP Gardsman proportion.ng controller, the instrument is of use wherever exact temperatures must be maintained.

The proportioning controller automatically adjusts the ratio of power "on" and "off" over a given time cycle to maintain any desired temperature set with the index pointer. This control results in a straightening out of the temperature curve, as shown in the accompanying illustration. The controller thus anticipates and corrects for thermal inertia by preventing control point overshooting on most installations, with resultant improvement in production.

A feature of the Model JP is that the meter pointer indicates the accurate temperature at all times because the proportioning action takes place in the controller section of the circuit and does not affect the reading of the indicating pointer. The new controller is available in 36 standard scale and thermocouple ranges and may be powered by either 115-or 230-volt, 60-cycle lines.

Editorials

The Need of a Full Report of the Government's Synthetic Rubber Program

IN PRIVATE industry, if a research department of a corporation spent more than $30,000,000 in the course of 10 years, its stockholders as well as its corporate management would have reason to expect that both interim and final reports on the various projects investigated would be available in a correlated form for examination at any time.

The Synthetic Rubber Division, formerly the Office of Rubber Reserve, of the Reconstruction Finance Corp., has had the responsibility for research on synthetic rubber in connection with the government rubber program for the past 10 years. Although numerous technical and scientific papers have been published by workers under contract with RFC, no overall summary or correlation of the work done has ever been made. Within the next year or two the major responsibility for research and synthetic rubber may pass from government to industry. The time has come for the preparation of a full report on government research on synthetic rubber over the past decade.

This issue of India RUBBER WORLD carries a story on the organization of the Library of the Division of Rubber Chemistry of the American Chemical Society in which it is reported that the Library originally planned to collect all the records of synthetic rubber research made available by the government, but "the proposal to collect, sort, and make available in useful form the complete story of the wartime development of synthetic rubber was thoroughly studied and dropped for several reasons. Collating and editing the vast mass of material available would have been a monumental task from the standpoint of both time and money required," it was said.

Another reason given for not undertaking this "monumental task" was the decision of the Division of Rubber Chemistry to publish its own monograph on synthetic rubber. This publication, which should be available by mid-1952, cannot be considered, however, as a substitute for a full report on the government's synthetic rubber research and development program.

There have been reports on the overall synthetic rubber program for which RFC has been either directly or indirectly responsible, but the amount of space devoted to details of the research part of the program has been very small. The "Report on the Rubber Program—1940-1945—Rubber Reserve Company," issued in February, 1945, included about a page on the subject of research. At that time it was mentioned that about $12,000,000 had been authorized for research work.

"Synthetic Rubber—Recommendations of the President," issued in January, 1950, and sometimes referred to as the "Steelman Report," was quite comprehensive in scope, but again the subject of research was disposed of in a little more than two pages. Expenditures for research now amounted to $25,000,000.

The "1951 Annual Report and Financial Statements —Reconstruction Finance Corporation," released on December 24, 1951, contains, in the section devoted to synthetic rubber operations, a list of the most noteworthy achievements of the research program for that year, and a statement that expenditures for research and development for the fiscal year 1951 amounted to $5,989,677. One of the "achievements" listed was the "preparation of 93 articles for publication in scientific and technical papers," but where these papers were published and what the results reported meant to the program as a whole were not explained.

India RUBBER WORLD has been concerned for some time about the need of the preparation of a complete, correlated, and edited report on the government's research and development program on synthetic rubber. Although the job has been delayed so long that it now represents a tremendous task, not to prepare such a report before the government program is reduced materially would mean that a large part of the money spent for research on synthetic rubber would, in effect, be wasted. The plants that have been built and the millions of tons of synthetic rubber that have been produced are more than enough justification for the several hundred millions of dollars spent for those purposes, but a proper record, which is part of the justification for the $30,000,000 spent on research and development, is still to be provided.

The proposed extension of the Rubber Act of 1950 for another two years should include some provision for the preparation of this full report on the government's synthetic rubber research activities.

Plastics Industry Growth

WHILE the rubber industry has enjoyed the highest production rate in its history during the past two years, the plastics industry, in whose operations the rubber industry is taking an increasing interest, has grown at an even faster rate.

Consumption of synthetic resins in 1940 amounted to only 138,407 short tons, but by 1950 this consumption amounted to 1,075,259 short tons. Natural and synthetic rubber consumption in 1950 was about 1,410,000 short tons.

R. G. Seaman

DEPARTMENT OF
PLASTICS TECHNOLOGY

Vinyl Film Extrusion[1]

Willard deCamp Crater[2]

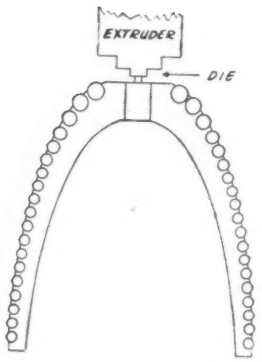


Fig. 1. Diagrammatic View of Parabolic Stretcher Used in Germany for Expanding Extruded Polystyrene Film

EXTRUDERS of both the ram and the screw types have been used for many years to fabricate rods, shapes, and tubes from rubber, plastics, and explosives. The use of extruders for the production of plastic sheeting and film, on the other hand, is relatively new. Although considerable work was done prior to World War II, the developments and progress made during the postwar period in both machines and materials clearly demonstrate that the extrusion process can open many new markets for film and sheeting.

Early cellulosic films manufactured by the wet process demonstrated the practicability of the extrusion method. Today cellulose acetate is extruded into films of less than one mil in thickness and more than 60 inches in width.

In Germany, polystyrene film has been produced by extruding a tube and stretching it laterally over a series of small rollers outlining a parabola, while simultaneously stretching the tube longitudinally by a dual take-up. A diagram of this parabolic stretcher is shown in Figure 1. The expanded tube was slit into two sheets upon leaving the wide end of the stretcher. Finished film 0.003-0.008-inch in thickness, with a gage tolerance of 15%, was produced from extruded tube having a wall thickness of 0.040-0.080-inch.

In this country polystyrene film is extruded and oriented by a somewhat different method. Vinyls and polyethylene were first extruded into thin tubes, and the tubes then were expanded with air to diameters somewhat larger than the die. Polyethylene film has gained widespread use in the past few years, and the bulk of this film is made by the extrusion process. By the use of circular dies, relatively small tubes are now expanded with air to several times the original diameter (see Figure 2-D.) Flat sheets up to approximately 100 inches in width are produced by the use of manifold dies (see Figure 2-E). It is also possible to laminate continuously the extruded film to paper or cloth.

There is a definite need of thin-gage vinyl film (one mil to three mils in thickness) for packaging applications. Luvitherm plasticized polyvinyl chloride film has been produced by the Germans on calenders in very thin gages. This unilaterally stretched film has been reported to withstand —80° C. in rapid freeze packaging of foods. In addition, three-year tests showed that this film had better resistance to acid fruits, milk, and pickles than has tin.

Some time ago Naugatuck Chemical recognized this need of thin-gage vinyl film and embarked on a development program. Since they offered the most promise, properly streamlined circular cross-head dies were investigated first. A suitable die of this type was prepared by Modern Plastic Machinery Corp. for use in this work (see Figure 3). Processing techniques and formulations have now been developed to a point which clearly indicates that satisfactory thin vinyl film for packaging applications can be made when the resin is plasticized with monomeric, polymeric, and nitrile rubber types of plasticizers either alone or in combination with each other.

Extruder Die Design

Dies designed to eliminate stagnation and facilitate streamlined flow are of paramount importance in the extrusion of any plastic. Many of the dies currently used to extrude plastics having sharp melting points, such as nylon, saran, and polyethylene, are usually unsatisfactory for polyvinyl chloride. The newer-type vinyl dies, however, may be used for these other plastics.

To date, thin vinyl films have not been extruded from wide, flat dies. Many film manufacturers insist that this development is necessary for finer gage control and point to the excellent experience they have had with manifold dies for the extrusion of polyethylene. Several types of film dies are shown in Figure 2, and the fan or modified manifold type of die appears to offer the best possibility for extruding wide vinyl sheeting.

A standard fan die capable of extruding sheeting as wide as 80-100 inches would be very expensive, however, and undoubtedly would cost much more than the extruder itself. Present manifold dies, either end fed or center fed, hold too large

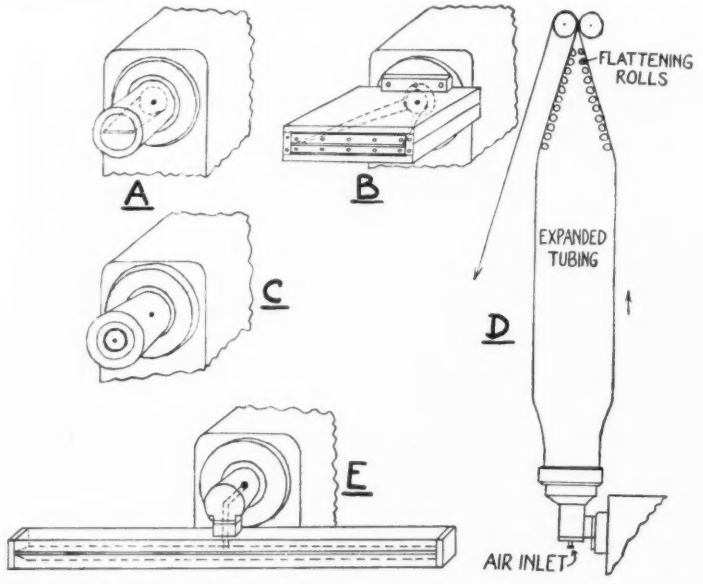


Fig. 2. Types of Film and Sheeting Extrusion Dies: (A) Belt or Strip Die; (B) Fan-Type Die; (C) Standard Tube Die; (D) Blown Tube-Type Die; and (E) Manifold-Type Die

[1] Presented before Plastics Film, Sheeting, and Coated Fabrics Division, Society of the Plastics Industry, Inc., New York, N. Y., Dec. 13, 1951.

[2] Assistant manager, vinyl sales, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

a volume of stock for successful operation with vinyls. Work is now in progress to improve this type of die.

Film Quality

The principle of lowering gage to reduce price is a mistake if the product is of unsatisfactory quality for a given application. For certain end-uses lower gage film is entirely suitable and is used with excellent results. The wartime Pistol and Personal Effects Bag, manufactured in accordance with Specification P.Q.D. 377-B, is a good example.

Many of these bags were prepared from calendered four-mil films with two or three heat-sealing operations. A large percentage, however, was made by extruding both vinyl and polyethylene tubes which required only one seal at the bottom. Not only were less time and labor involved in sealing, but further savings were effected because the extruded vinyl bag was stronger and permitted the use of a thinner wall.

The comparative properties of bags prepared by both methods are shown in Table 1.

Since commercial vinyl films prepared by calendering, organosol casting, and extruding are not directly comparable owing to formulation differences, laboratory samples were prepared by these methods using a uniform resin: plasticizer ratio. The results in Table 2 show the advantages of the films produced by extrusion.

TABLE 2. COMPARATIVE PROPERTIES OF CALENDERED, ORGANOSOL CAST, AND EXTRUDED VINYL FILMS HAVING THE SAME RESIN:PLASTICIZER RATIO (RATIO, 100:45; FILMS TWO MILS THICK)

	Calendered	Cast	Extruded
With Grain:			
Tensile strength, psi. . .	2600	2700	2800
% Elongation at break	200	170	160
Elmendorf tear, lbs./in.	130	820	750
Against Grain:			
Tensile strength, psi. . .	2000	2500	2300
% Elongation at break	120	150	180
Elmendorf tear, lbs./in.	210	560	540
Average tear, lbs./in. . .	170	690	645

Economic Factors

The extrusion process has rapidly replaced manufacture of cellulosic film and sheeting by both the skived polished sheet and solvent casting methods. The obvious economical advantages are the replacement of a batch process with a continuous process and the elimination of costly solvents. The use of solvents and diluents are also a disadvantage of the vinyl organosol method of making film.

Calenders can out-produce present-day extruders in heavy gage film and sheeting, as illustrated in Table 3. Greater flexibility in gage and width of film, however, is provided by the extruder. Blown vinyl film varying from less than a mil to three mils in thickness has been produced in widths extending up to 130 inches.

A 96-inch calender for making film two mils in thickness may cost up to a quarter of a million dollars. A 4½-inch tuber, although having only one-quarter of the output of this calender, costs less than $25,000 complete with die. Considering both the initial cost and production rate, the extruder provides an economic advantage in excess of a 2:1 ratio.

In the future, larger extruders will undoubtedly be employed, and several extruding machines may be used to feed one die to increase output. Compounding with large screw machines for calender feed has also been accomplished with varying degrees of success. Further developments may well prove that this process is both feasible and economical, since it has already been demontrated in manufacturing molding powders.

TABLE 1. AVERAGE PROPERTIES OF EXTRUDED AND CALENDERED PISTOL AND PERSONAL EFFECTS BAGS

	Gage, Mils	Elmendorf Tear		% Elongation at Break	Tensile strength, Psi.	Bags per Lb.
		Grams	Lbs./In.			
Polyethylene, extruded	4.0	33	340	380	1650	24
Vinyl, extruded	2.5	123	1850	240	2600	32
Calendered	4.0	44	380	230	2550	16

TABLE 3. COMPARATIVE FILM YIELD RATES OF CALENDERS AND EXTRUDERS

Calender roll width, in.		66			84			96	
Usable film width, in.		54			72			84	
Film yield rate, yds./min.	50	75	100	50	75	100	50	75	100
Yield rate, lbs./hr., of film:									
1 mil thick	267	401	534	356	534	712	415	622	830
2 mils thick	534	802	1068	712	1068	1424	830	1244	1660
3 mils thick	801	1203	1602	1068	1602	2136	1245	1866	2490
4 mils thick	1068	1604	2136	1424	2136	2848	1660	2488	3320
Extruder size, in.		1½	2½	3½	4½	6	8		
Yield, lbs./hr.		35	120	220	400	600	800		

Summary and Conclusions

The trend toward smaller individual-type packaging units will continue to expand the markets for thin gage films made of plastic material of various kinds. The extrusion process will continue to be a major method of manufacture.

Transparent film has the advantage of exhibiting the product to the purchaser. Many films also offer resistance to moisture, grease, and chemicals. The present large diameter tubing employed for packaging chemicals in drums is an example.

High-strength laminations produced by extruding films directly on paper, foil plastics, and fabric will open up new markets. The success of polyethylene-on-paper, and vinyl organosols cast on rayon and other fabrics are examples.

Extruded polyvinyl chloride film is now on the verge of real commercial exploitation. Because of its strength, clarity, and feel, it should play a major role in the markets for thin-gage film.

Fig. 3. Extruder with Circular Cross-Head Die for Making Blown or Air Expanded Tube Film

Hercoflex Plasticizers

AN INCREASE of 40% in its production capacity for Hercoflex vinyl plasticizers has been announced by Hercules Powder Co., Wilmington, Del. First introduced to the trade in 1949, these plasticizers, made at Hercules' Mansfield, Mass., plant, are available in three types, Hercoflex 150, 250, and 290.

Hercoflex 150 and 250 are primary phthalate-type plasticizers whose low-temperature and low-volatility properties are claimed superior to those of conventional phthalates. These advantages permit improved performance and economies in formulation of vinyls.

Hercoflex 150 is manufactured from a selected blend of straight-chain octyl and decyl alcohols. It processes readily with the various vinyl chloride polymers and copolymers and exhibits excellent stability to heat and light. Hercoflex 250 has found use throughout the vinyl industry wherever phthalate esters are employed, since this material is said to offer performance characteristics otherwise attainable only with costly blends of plasticizers.

The increase in production capacity also makes the third plasticizer, Hercoflex 290, available for the first time in tank-car quantities. Hercoflex 290 is the adipic acid ester of a blend of straight-chain octyl and decyl alcohols. It is said to combine the excellent low-temperature performance and economy of adipates with the low volatility associated with conventional phthalates, azelates, and sebacates. Plastisols of very low viscosity and good stability are possible with Hercoflex 290.

SPE Holds Successful Conference at Chicago

A HIGHLY successful meeting from the standpoint of registration and program quality characterized the eighth annual national technical conference of the Society of Plastics Engineers, Inc., held January 16-18 at the Edgewater Beach Hotel, Chicago, Ill. The total attendance of 717 members and guests, drawn from all parts of the United States and many foreign countries, fell somewhat short of the 1951 conference figure, but those present took an active interest in the program. In addition to the usual technical sessions, comprising many panel discussions and the presentation of papers, the three-day meeting included the Society's annual business meeting, luncheon, and banquet.

Wednesday Afternoon, January 16

The opening session of the conference was a forum on **"What Should Plastics Engineers Know,"** conducted by the Society's national educational committee. In the absence of Committee Chairman J. M. Church, Columbia University, the forum was presided over by Louis F. Rahm, Princeton University. Panel members included E. S. Bloom, E. I. du Pont de Nemours & Co., Inc.; J. H. DuBois, Plax Corp.; R. A. Hoffer, General Electric Co.; and Prof J. W. Lindau, University of South Carolina. Some of the points brought out in the lively discussion were the need of some economics training of technical students in colleges; the need of undergraduate schools to provide a broad, fundamental background in engineering, with more specialized training to be provided by post-graduate study or industry training courses; and the need of more thorough and systematic education of plastics engineers by colleges and universities.

"Plastical Archeology," Johan Bjorksten, Bjorksten Laboratories, Inc. The subject of plastics development during the period from 1900-2100 was covered by means of a report on an archeological research project conducted 25,000 years from now. Using accepted archeological presentation methods and special photographic slides, Dr. Bjorksten presented a fascinating glimpse of what can be expected from plastics in the future.

"Extrusion of Large Piping," E. C. Blackard, Tennessee Eastman Corp. Detailed information was presented on laboratory techniques for the extrusion of sheeting, piping, and variegated strip from cellulose acetate and cellulose acetate butyrate. Factors discussed in detail included hopper drying of material, extrusion temperature, screw design, and take-off of extruded parts.

Thursday Morning, January 17

The prize winning papers in the 1951 SPE Prize Paper Contest were presented at the morning session prior to the regularly scheduled papers. The winning papers, in the order of their selection, follow: (1) **"A Proposal for Establishing Certified Injection Molding Machine Specifications,"** D. J. Sloane, Lester Engineering Co.; (2) **"The Use of Air-Gap Insulation in Plastic Molds,"** Wm. Kosobud, Detroit Mold Engineering Co.; and (3) **"A Compound Curve Honeycomb Core Material for Sandwich Panel Construction,"** A. H. Herbst, Irvington Varnish & Insulator Co.

"ASTM Standards and Their Effect on Plastics Technology," Robert Burns, Bell Telephone Laboratories, Inc. This paper was a discussion of standardization techniques for the evaluation of plastics, and the contribution of such techniques in all phases of plastics technology from research to procurement. The procedure by which a standard is developed and adopted by ASTM was also described in detail.

"Modified Phenolics," Wyman Goss, General Electric Co. Rubber-modified phenolics provide greater resistance to fatigue and shock than pure phenolics, lower specific gravity, and lower modulus in flexure. The modified phenolics are free machining, but require larger knockout pins in molding and deeper knurls on inserts because of their increased flexibility. New formulations are now available for use in laminating.

"Stress Gremlins in Thermosetting Plastics," H. M. Quackenbos, Jr., Bakelite Corp. Certain physical property tests on plastics, as performed in the laboratory, do not predict performance in service and can lead to serious difficulties. Some of these tests have now been modified to bridge the gap between laboratory and service. In this connection we now realize that laboratory tensile test values are markedly higher than those shown by a part in service where there is long-term loading. Residual stresses can also either strengthen or weaken a part, depending on the type of loading in service. Water absorption values, in terms of per cent. weight gained by a part upon immersion for 24 hours at 25° C., may not correspond to absorption values obtained in long-term tests.

"Injection Molding of Heavy Sections of Polystyrene," Gordon M. Thayer, Dow Chemical Co. In injection molding of heavy section parts the objective is to fill the mold quickly with the correct amount of plastic and to trap the charge without packing. While several methods are available, the suggested procedure involves the use of weighed-starved feeding because of the high degree of precision in control it affords.

Thursday Afternoon, January 17

This session began with a panel discussion on **"Reinforced Plastics,"** under the chairmanship of A. J. Wiltshire, Apex Electric Mfg. Co. Each of the panel members spoke briefly on a class of product, and these talks were followed by a question and answer period. Panel members and their topics were: Ralph Benson, Crosley Division, Avco Mfg. Co.—refrigerator food liners; Milton Brucher, Zenith Plastics Co.—glass reinforced plastic chairs; Thomas DeMarco, Monsanto Chemical Co.—Fiberglas reinforced polystyrene; Joseph Finger, Corrulux Corp.—corrugated glazing material; Robert Morrison, Molded Resin Fiber Co.—Fiberglas-polyester trays; J. D. Robinson, Perrault Bros., Inc.—piping; and Roger White, Laminated Plastics, Inc.—molding of intricate glass fiber-filled parts.

"Preplasticizers," R. W. Powell, Hydraulic Press Mfg. Co. The design and the operation of the company's new preplasticizing injection molding machines were discussed. Samples of different parts molded on these machines were displayed and described, and the speaker also discussed the effect of preplasticizing on future machine design.

A symposium was presented by the SPE professional activities committee, under the chairmanship of S. L. Young, C. F. Church Mfg. Co. S. L. Glick, Monsanto, acted as moderator; and speakers were L. M. Debing, also of Monsanto; Jack Totten, Ford Motor Co.; A. R. Morse, Injection Molders Supply Co.; and J. T. Formo, Minneapolis-Honeywell Regulator Co. Mr. Debing dealt with the use of statistical quality control in the plastics industry, with particular reference to the value of control charts in improving molding operations. Mr. Totten considered the requirements for plastic parts in the automotive field, and emphasized the continuing need of sound engineering practice in developing new applications. Mr. Morse reported on the results of extensive tests made on various types of mold release agents. While many injection molding conditions, such as plunger dwell time, have a greater effect on the molded part than the mold lubricant, the use of proper lubricants will provide further improvement in part appearance when all molding conditions are at an optimum. Mr. Formo spoke on **"A Dreamer's Future for Plastics,"** outlining some of the hoped-for developments in the plastics field with regard to materials, properties, and applications.

The annual banquet took place in the evening, and featured the announcement of the Society's 1952 national officers, as follows: president, William O. Braken, Hercules Powder Co.; vice president, Walter F. Oelman, Standard Molding Corp.; secretary, John W. La Belle, Koppers Co., Inc.; and treasurer, Don F. Hoffman, Evans-Winter-Hebb, Inc. Outgoing national President Islyn Thomas, Thomas Mfg. Co., presided over the banquet and presented awards to the authors of the prize paper contest winners, and to Edward H. Roberts, of the Northwestern Pennsylvania Section, for his winning entry in the SPE Pin Design Contest.

After-dinner speaker was Major General Ward H. Maris, Deputy Assistant Chief of Staff for Research and Development, who described the work of the Army research and development group in developing new weapons and improving existing equipment. Some of the new developments include improved tanks, missiles guided by radar, detectors for nonmetallic mines, atomic artillery, improved anti-tank arms, and others. Laminated nylon protective clothing and helmet liners have given excellent results in protection against bullets and shell fragments. Titanium metal is being investigated as a replacement for steel in armor and heavy equipment.

Friday Morning, January 18

"High Impact Styrenes and Copolymers," Paul M. Elliott, Naugatuck Chemical Division, United States Rubber Co. This paper reviewed the development and current status of polystyrene copolymers, their properties and typical applications, and the outlook for new material developments and new applications.

A panel discussion on **"Mold Design"** was presented under the chairmanship of Carl F. Massopust, General American Transportation Co. E. F. Borro, Durez Plastics & Chemicals, Inc., spoke on **"A Brief History of Molds and Moldings,"** emphasizing that a well-designed mold can be placed into production without a lengthy breaking-in period. W. P. Gobeille, Nash-Kelvinator Corp., whose topic was, **"Are Some Mold Design Problems Those of Temperature Control?"**, noted that provision for temperature control of a mold should be incorporated early in

mold design and explained the cooling system used in refrigerator panel molds. W. G. Harvey, Guy Harvey & Sons, treated of **"A Formula Method for Estimating Basic Mold List Prices."** **"The Little Gremlins in Mold Design"** was discussed by W. I. Pribble, Barrier & Pribble, Inc., who affirmed the need of a mold designer to check every detail or possible source of difficulty with the molder to prevent any difficulties in production molding. V. G. Reiling, Kurz-Kasch, Inc., spoke on **"Some Uses of Meehanite in High-Pressure Mold Designs"** as a means of reducing mold maintenance costs.

A panel discussion of **"New Applications and Design of Plastics"** was presented with J. O. Reinecke, J. O. Reinecke & Associates, acting as moderator. Panel members were Wynn Cooper, Bakelite; James Johnston, Chicago Molded Products Co.; Eric Furholman, consultant; Jack Davis, Motorola, Inc.; and Thos. Muckenfuss, Radio Corp. of America. In short talks given before the question and answer period, Mr. Cooper discussed the properties and uses of molded furniture drawers; Mr. Johnston stressed the need of designing plastic parts for quality and longevity, rather than just for low cost; Mr. Furholman dealt with injection molding glass filled thermoplastics; Mr. Davis presented typical end-user complaints against plastics in radio cabinets; Mr. Muckenfuss discussed the buyer's viewpoint of plastics industry practices; Mr. Reinecke pointed out the need of further improvement of styling design.

Friday Afternoon, January 18

The final session of the conference began with the Society's annual luncheon, featuring a talk on **"Molecular Engineering in Plastics"** by G. F. D'Alelio, Koppers. While plastics were first used only as novelties and gimcracks, the current status of plastics is due to engineering development in materials, processing, and applications, Dr. D'Alelio stated. Molecular engineering, in the form of modifying existing polymers and developing new polymers, can be teamed with product engineering to provide unlimited future growth for plastics.

"Extrusion of Vinyl Film," A. M. Stover, Naugatuck Chemical. This paper reviewed some of the problems encountered in developing compounds and techniques for the extrusion of blown films. The production of high-strength blown vinyl films in thin gages now seems commercially feasible and promises to provide new markets for plastics.

"The Role of the Engineer in Sales," Amos Ruddock, Dow, and Edmund D. Kennedy, Monsanto. Mr. Ruddock spoke from the viewpoint of the proprietary molder; while Mr. Kennedy discussed the subject from the viewpoint of the custom molder. Both speakers emphasized the need of the plastic engineer to aid sales by encouraging sound applications for plastics. Price considerations have often been emphasized more than quality of product, and the engineer must accept his responsibility to improve both product and sales quality by cooperating more closely with his sales personnel.

A symposium on military applications of plastics, under the chairmanship of R. K. Gossett, Gossett & Hill Co., concluded the program. Speakers at this symposium were Lt. Col. E. L. Sundberg, Director of the Midcentral Air Procurement District, Air Force Material Command; John Alpers, Bureau of Ships, Navy Department; Gerald Reinsmith, Army Ordnance Corps; and Warren G. Stubblebine, Office of the Quartermaster General. Colonel Sundberg discusssd the use of plastics in aircraft and listed the following development aims for polyesters: improvement in certain strength properties, such as modulus; reduction in cost; reduction of drop in properties after immersion or humid weathering; resistance to temperature deterioration; improved gunfire resistance; and improved resistance to erosion by rain in high-speed flight.

Mr. Alpers described the use of plastics in Navy vessels and noted that these applications are based on resistance to corrosion, as in piping and tanks; non-magnetic properties; and light weight, as in flotation gear. Mr. Reinsmith reviewed the course of development of an Army ordnance item and noted that the Corps strives to use plastics as engineering materials rather than as substitutes. The Ordnance Corps is currently engaged it development work on polyester water tanks, amphibious duck hulls, and boxes; unplasticized vinyl multi-compartment containers for bearings; and spare parts bags. Mr. Stubblebine stated that Quartermaster uses of plastics are based on plastics as materials having properties unobtainable with other materials, and on plastics as substitutes for critical material. Most applications use reinforced plastics because of their high impact strengths and corrosion resistance, and the thermal limitations of thermoplastics make these materials of little interest to the Quartermaster Corps.

New York-Newark Meeting

The Newark Section was host to the New York Section at a joint dinner-meeting on January 9 at the Military Park Hotel, Newark, N. J. Approximately 125 members and guests heard J. R. Charlton, Ciba Co., spea on "Araldide Resins," and J. T. Leyden, Crucible Steel Co. of America, discuss "Use of Prehardened Steels for Molds."

Mr. Charlton dealt with the epoxy resins made by the reaction of epichlorohydrin and bis-phenol. The reaction product is a brittle, thermoplastic resin further combined with a cross-linking agent to produce a thermosetting resin. After reviewing the history of these resins, the speaker noted that the thermoplastic resins are being used as light stabilizers for vinyl plastics and as ion exchange resins in water purification. The thermosetting epoxy resins are commercially available in three classes of products: (1) coating resins which provide outstanding toughness and chemical resistance, as used chiefly in linings for drums and cans; (2) adhesives which possess great wetting power, flowability without pressure, and which can bond to any metal; and (3) casting resins which provide high impact resistance, good adhesion to ceramics, and are castable without pressure. No epoxy molding compounds are available commercially as yet, but development work on such compounds is in progress.

Mr. Leyden emphasized that any steel used for plastic molds must meet the four essential requirements of cleanliness, soundness, minimum size change upon hardening, and ability to take a high polish. Using slides to illustrate his talk, the speaker discussed the various steels used for molds, cut dies, and hobbing, including their compositions, properties, and handling.

In the business session preceding the talks, Newark President E. W. Rowan, Dillon-Beck Mfg. Co., introduced the New York officers present, and also announced the appointment of the following Newark committee chairmen: credentials, R. H. Hoehn, Mack Molding Co.; program, D. W. Biklen, Orangeburg Mfg. Co.; house, D. H. Garrison; publicity, Edward Ackerman; SPE representative, Anthony Naturale, Naturale Tools, Inc.; education, P. W. Simmons, Dow Chemical Co.; and professional activities, W. M. Schrag, Gering Products, Inc. Table favors were distributed through the courtesy of W. M. Lester, Pyro Plastics Corp., and there was a drawing for door prizes contributed by Islyn Thomas, Thomas Mfg. Co.; C. J. Ziegfield, Hydraulic Press Mfg. Co.; Mr. Rowan; Harry Witt, Atlas Consolidated Co.; C. B. Cotton, Alexander Hertz Co.; and G. H. Rieder, R. A. Koegel Stamp & Die Co.

Pearlescent Vinyl

A FLEXIBLE vinyl in new pearlescent patterns made its first appearance in the furniture market during January in New York, N. Y. Called Inlaid Pearl Ultron, the new plastic fabric was developed by Monsanto Chemical Co., Springfield, Mass., and is distinguished by a permanent pattern designed to withstand hard, steady wear. According to R. C. Evans, assistant general sales manager for Monsanto's plastics division, the new fabric was developed after months of extensive research and color experimentation and is produced by a special process. Pearl Ultron is currently available in 12 colors, as well as ivory and black, and research is proceeding on additional shades.

Vinyl Plastigels

A NEW formulation of Vinylite dispersion resins that offers production and equipment economies and opens up many new fields of application has been announced by Bakelite Co., a division of Union Carbide & Carbon Corp., New York, N. Y. Known as Vinylite plastigels, the new material was developed in Union Carbide's fellowship laboratories at Mellon Institute of Industrial Research. The material can be molded, calendered, embossed, stamped, and extruded and also can be used for coating cloth and paper and the dip coating of wire objects.

Plastigels of Vinylite resin resemble putty in consistency in their raw state. While relatively stiff, they can be softened quickly at room temperature by stirring or kneading, and formed by hand pressure, molds, or dies into complicated shapes and fine details. After forming, the plastigels gradually stiffen again and become self-supporting. They bake to a hard, finished state in about 10-15 minutes at 350° F. without sagging, shrinking, or otherwise losing their formed shapes.

Particularly suited for floor tile, tubing, intricate electrical fittings, toys, novelties, and similar parts, the plastigels offer an important advantage in that they can be

(*Continued on page* 598)

Scientific and Technical Activities

Chicago Rubber Group Symposium on Rubber-to-Metal Bonding

A TRANSCRIPT of the Chicago Rubber Group Symposium on Rubber-to-Metal Bonding, which was held at the Morrison Hotel, Chicago, Ill., November 9, 1951, has been received and is reported herewith. A brief mention of this meeting was made in our December, 1951, issue on page 327.

H. A. Winkelmann, Dryden Rubber Division, Sheller Mfg. Corp., was the moderator for the panel discussion. Members of the panel were S. L. Brams, Dayton Chemical Products Laboratories; C. G. Cashion, Xylos Rubber Co.; M. E. Jones, Marbon Corp.; G. C. Maassen, R. T. Vanderbilt Co.; H. B. Puff, Durez Plastics & Chemicals Corp.; and R. Smith-Johannsen, General Electric Co.

Short talks on rubber-to-metal bonding, with special reference to the bonding agents marketed by the companies they represented, were made by the several members of the panel. W. G. Gurich, B. F. Goodrich Co., also described Plastilock adhesives made by that company.

Development, Classification, and Use of Adhesives

Dr. Winkelmann in his introductory remarks stated that the development of adhesive cements for bonding of rubber to metal has resulted in many new industrial applications for rubber during the past 15 years. Cements for bonding rubber to metal were in use 27 years ago, but were not commercially available. Adhesive bonding of rubber to metal represents a specialized technique which has materially aided rubber engineering progress.

The brass-plate method for bonding rubber to metal has been widely used in the automotive industry. Brass plating requires special rubber compounds. The need of bonding various types of rubber to a variety of metals has resulted in the development of a number of cements which give excellent adhesion.

Many molded articles require metal backing or inserts. Steel, stainless steel, cast iron, aluminum, magnesium, cadmium, tin, bronze, brass, etc. are bonded to rubber with satisfactory adhesion strength. The selection of the adhesive cement depends on the type of compound, metal, and ultimate service requirements of the product. (See the accompanying table.)

Rubber mounts are widely used in automotive and aircraft assemblies. They are also used in marine installations and agricultural, household, and industrial equipment to reduce vibration and noise. Flexible mountings relieve stresses that would be encountered with rigid mountings. The protection of instruments, radio, television, and electronic equipment is accomplished by rubber-to-metal bonded parts of suitable shape and design. Tank linings for handling chemicals require special bonding techniques. Many metal parts are rubber covered to reduce wear and abrasion and to give structural support and also to provide necessary cushioning.

The purpose of this symposium is to present to rubber technologists the various adhesives for bonding natural and synthetic rubber to different metals and to direct attention to the preferred procedure of handling and processing each adhesive to obtain the optimum bond for a given assembly. The rubber product manufacturer in trying to solve an adhesion problem should test each adhesive according to recommended procedure and finally adopt the one which meets the specific service requirements.

The Chicago Rubber Group in planning this symposium invited all manufacturers of adhesives for bonding rubber to metal to participate, and their response has resulted in this compilation of information that should be a convenient reference for the rubber technologist and engineer on bonding of rubber to metal problems.

Two adhesives, Braze and the silicone adhesives, were presented at this symposium for the first time at any technical meeting. It is therefore timely that a meeting such as this one was held to correlate information about available adhesives.

Thixon Bonding Agents

Mr. Brams explained that Thixon bonding agents, Dayton Chemical Products, include a group of cements which have found great utility in bonding rubber and rubber-like materials to metal. These bonding agents are black, solvent dispersed systems containing various chemicals and polymeric materials; all are tack free before cure and develop bonding characteristics during cure and the influence of heat and pressure.

There are two general classes of Thixon bonding agents. The B series include cements for use with all general-purpose polymers for bonding to brass plate; however, all of the B series have also found significant application as adhesion boosters in connection with the application of prime coats to metal. The M series cements are intended for use where the rubber is directly applied to metal without brass plate, using one coat of cement.

TABLE 1. CEMENTS FOR BONDING RUBBER TO METAL

Adhesive	Natural Rubber, GR-S, LTP*	GR-S	Neoprene	Nitrile Rubber	Butyl	Silicone	Bonding Surface	Supplier
Braze	x		x		x		Steel, cast iron, black iron, cadmium analoy	R. T. Vanderbilt Co.
Loxite 3000	x		x	x	x		Ferrous metals, brass, aluminum, zinc	Xylos Rubber Co.
1055							Cover cement over Loxite 3000	Xylos Rubber Co.
Thixon CB & CB2	x						Brass plate or primed surfaces	Dayton Chemical Products Laboratories
NB			x				Brass plate or primed surfaces	Dayton Chemical Products Laboratories
AB				x			Brass plate or primed surfaces	Dayton Chemical Products Laboratories
IB					x		Brass plate or primed surfaces	Dayton Chemical Products Laboratories
CM	x						Steel, aluminum, stainless steel, tin, cadmium	Dayton Chemical Products Laboratories
NM			x				Steel, aluminum, stainless steel, tin, cadmium	Dayton Chemical Products Laboratories
AM				x			Steel, aluminum, stainless steel, tin, cadmium	Dayton Chemical Products Laboratories
Ty-Ply "Q"	x				x		Ferrous and nonferrous metals	Marbon Corp.
"3640"	x				x		Ferrous and nonferrous metals	Marbon Corp.
"S"			x	x			Ferrous and nonferrous metals	Marbon Corp.
"BN"				x			Ferrous and nonferrous metals	Marbon Corp.
Phenolic (12987)				x			Steel, copper, brass, aluminum, tin plate, galvanized iron, stainless steel	Durez Plastics & Chemicals, Inc.
SS-67						x	Metals, glass, ceramics, plastics primer	General Electric Co.
15						x	Metals, brass, magnesium, with primer	General Electric Co.
64						x	Metals, brass, magnesium; no primer used	General Electric Co.
Dri-Lock	x						Brass plate	B. F. Goodrich Co.
Plastilock 315			x				Ferrous and nonferrous metals; metal primer	B. F. Goodrich Co.
102				x			Ferrous and nonferrous metals	B. F. Goodrich Co.
600 Series				x			Ferrous and nonferrous metals	B. F. Goodrich Co.
A68B and A53B			x				Ferrous and nonferrous metals; tie cement air curing	B. F. Goodrich Co.
R412T and R468T				x			Ferrous and nonferrous metals; printing trade	B. F. Goodrich Co.

*LTP—Low-temperature polymer—cold rubber.

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STATEX·M
FEF

- Rubber compounded with STATEX-M extrudes faster, produces clean-cut stocks with no surface roughness.
- Even in featheredged forms edges are sharp and clean.
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Thixon CB2 and CB are used for bonding natural, GR-S, and LTP GR-S stocks to brass plate or primed metals. With applications where brass plate is used, these cements function as one-coat materials. They produce excellent bonds with great consistency, reducing to a minimum in most cases the amount of scrap produced. The use of CB2 and CB as booster coats has frequently permitted the production of items where the rubber stock is difficult to bond to metal without the gums. CB2 cement is especially recommended for use with LTP GR-S stocks, as well as with stocks where the best accelerator combination for optimum processing and curing results in stocks more difficult to bond to metal.

Thixon NB and AB are recommended for adhesion of neoprene and nitrile rubber stocks to brass plate. They are also used as boosters with a prime coat.

Thixon IB has been approved in numerous laboratories for the bonding of butyl rubber stocks to brass plate or prime surfaces. Assemblies made in this manner pass all road and machine tests in automotive motor mounts with no adhesion failures, it has been reported.

Thixon AM, NM, and CM are available for one-coat adhesion systems where nitrile, neoprene, natural, GR-S, or LTP GR-S rubbers are used.

Various Thixon primers are also available for use with different B series cements.

Phenolic Resin Bonding Agents

The phenolic and modified phenolic resin bonding agents manufactured by Durez Plastics, were described by Mr. Puff. He said that the use of these resins as rubber adhesives falls into three broad classifications:

1. Powdered phenolics are used by themselves at approximately 25% solids in 50-50 methanol-methyl ethyl ketone solutions. The most popular resin is #12987. This resin has proved particularly satisfactory for bonding nitrile rubber to a variety of metals.

2. Various phenolic-type resins are used in conjunction with nitrile and neoprene rubbers to make solvent cements. As soon as the solvent is eliminated, strong bonds are obtained without the use of heat. These modified phenolic adhesives are very excellent general adhesives and will bond virtually all materials even though one or both of the surfaces to be bonded are hard and non-pourous. One of the major uses of these adhesives has been the bonding of vinyl plastics, one of the most difficult bonding problems. Several manufacturers of adhesives prepare cements based on phenolic resins, and it is often more satisfactory to the fabricator to purchase the prepared cement instead of making it from the resin itself.

3. Phenolic resin emulsions are used with nitrile rubber and high styrene latices. These resins provide an excellent means of reinforcing such latices. In addition such resins provide many possibilities for the production of heat-setting rubber cements when the latices are used. Research by Durez Plastics has indicated that the rubber-to-metal bonds obtained with the latex cements will be equivalent to those obtained with cements made with organic solvents.

Silicone Adhesives

R. Smith-Johannsen explained that silicone adhesives manufactured by General Electric are materials based on silicone elastomers and having the inertness and temperature resistance usually associated with this type of elastomer, but with the added ability to adhere to any of a large number of surfaces.

Elastomeric silicone adhesives are of two main types: those which employ a primer, and those which do not. Furthermore the choice of adhesive and technique of application depends on whether the adhesive is to be used in (1) the direct molding of silicone rubber to a solid surface, (2) the bonding of cured silicone rubber to itself, (3) the bonding of cured silicone rubber to a solid surface, (4) the bonding of other materials to one another, and (5) where the silicone is to be used as a sealer, and bonding is essential.

G-E has developed an air drying primer SS-67 which may be used to prime metals, glass, ceramics, or a variety of plastic surfaces. It is possible to mold SE 400 series silicone rubbers to surfaces primed with this materials. Likewise it is possible to employ any of these compounds as an adhesive in combination with the primer. A special compound SS 15 is considered the best general-purpose silicone adhesive since it is most easily applied and is effective on most surfaces. For example, machinable brass and magnesium, to which it is difficult to bond regular G-E silicone molding compounds directly, are easily bonded with SS 15.

Another material, SS 64, does not require a primer, and although it is not so strong as the molding compounds, the bond developed by SS 64 is extraordinarily resistant to many liquids. Because of this fact, SS 64 is considered mainly as a sealing compound. It is in the form of a liquid, therefore does not require the addition of organic solvents, and thus may be applied in a number of ways.

The basic properties of these new silicone adhesives are such that they make possible the use of adhesives in *new applications* where no adhesive has been used before. Also, silicone rubber may be used in many new conventional applications because it is now possible to mold it to metal inserts and to make rubber articles similar to those previously made with natural and other synthetic rubbers. Instrument and shock mounts are examples of this type of application.

Plastilock Adhesives

Goodrich Plastilock adhesives are used primarily for bonding nitrile rubber to ferrous and non-ferrous metals, according to Mr. Gurich. These adhesives, available in brush, spray, and roller coat grades and in tape form, give extremely good adhesion to these metals while having excellent high temperature characteristics. Plastilock adhesives will withstand almost any practical temperature that the compound may be subjected to in service.

Ty-Ply Adhesives

Ty-Ply adhesives produced by Marbon for bonding natural and synthetic rubber compounds to metals were discussed by Mr. Jones. These adhesives are free-flowing liquids, black in color, consisting essentially of specially developed resins in solution together with some dispersed solids. There are four Ty-Ply adhesives for rubber-to-metal bonding.

Ty-Ply "Q" and Ty-Ply "3640" are used for bonding natural rubber, GR-S, and certain butyl rubber compounds to metal during vulcanization. Ty-Ply "3640" is recommended in place of Ty-Ply "Q" when high humidity conditions prevail, and "3640" is also recommended instead of "Q" when a prolonged waiting period is necessary after metal inserts have been coated with Ty-Ply prior to assembly and vulcanization.

Ty-Ply "S" is recommended for bonding neoprene and nitrile compounds to metal.

Ty-Ply "BN" is recommended for bonding nitrile compounds to metal and is especially recommended where solvent and heat resistance are of prime consideration.

Braze

Braze, a product of the Vanderbilt company, was described as a non-tacky solvent-type halogentated rubber derivative bonding agent by Mr. Maassen. Braze is in solution form and drys to a tack-free surface. It is designed particularly for adhering natural rubber, GR-S, and neoprene to metals.

Metal surfaces should be free of oil, rust, grease, and other contamination and may be blasted, pickled, or wire brushed prior to coating with Braze. The usual precautions pertaining to cleanliness in adhesion operations should be followed

Because Braze is in the form of a solution there are no problems of pigment settling and no need of stirring to form a slurry or dispersion before use. Braze does separate into two liquid phases, however, and it is necessary to stir the material about once every 30 minutes in order to keep the two phases properly intermixed when in use.

Braze may be applied by brushing, spraying, or dipping. When sprayed or use for dipping, it may be necessary to dilute the adhesive with enough toluol or xylol to obtain satisfactory processing. In any event a thin uniform film is desirable.

For many applications it may be advantageous to use a coating cement over the Braze. Experience has shown that a cement made from a stock of approximately 60 durometer hardness is the most satisfactory. Cements to be used with natural rubber and GR-S are made with Hi-Flash naphtha as the solvent. For neoprene, a combination of toluol and Troluoil is used.

Stocks of all degrees of hardness can be bonded to metal with Braze. Best adhesions are obtained on compounds in the 50 to 70 hardness range.

Adhesions can be obtained by any of the conventional rubber molding processes, and in some instances satisfactory bonds are obtained when cures are made in boiling water at atmospheric pressure. For press curing operations temperatures between 260 and 350° F. are recommended. At 260° F. it may be necessary to use rather long periods of time in order to bring about good bonds.

Loxite 3000

Loxite 3000, made by Xylos, employs a new technique in the bonding of elastomers to metal, according to Mr. Cashion. It has been proved that this new technique eliminates the need of brass plating and tie gums and is unaffected by moisture or time delays in processing. At the same time uniform high-grade adhesions are produced which resist dynamic flexing, corrosion, and service failures.

While Loxite 3000 is especially suited for bonding natural and/or GR-S rubbers to iron or steel, it has produced excellent results with many other elastomers and metals. Loxite 3000 is applied at a temperature of from 150-170° F. and

may or may not require a cover cement, depending on the conditions of application.

Panel Discussion

Q. What cleaning methods are the most suitable for preparing metal to which rubber is to be bonded?

A. Blasting with Abrasive Grit. Mr. Maassen. The type of grit used (sand, carborundum, or metal) appears to make little difference, but *the grit must be clean.* Grit size of 80 mesh or finer gives the best results, and coarse grit should not be used. Blasting with coarse grit makes deep impressions in the metal surfaces, and when Braze is applied to a rough surface, there is a tendency for the material to settle in the low spots and leave the high spots bare. As a result, an inferior bond is obtained.

When a wire brush is used to clean the metal surface, a clean scratch brush is essential. If a brush is used to clean old rubber from a given part, that part or parts later cleaned with the same scratch brush are very likely to have surfaces which will not bond satisfactorily.

A. Degreasing. Mr. Cashion. Grease, oil, and dust are removed from metal surfaces by trichloroethylene or perchloroethylene, preferably in a vapor-phase degreaser.

A. Chemical Cleaning of Metals. Mr. Jones. The size and the shape of the metal part to be bonded often make blasting impractical and uneconomical. In such cases chemical cleaning methods, which give a chemically changed metal surface to which it is much easier to bond, are used.

Phosphoric or other strong mineral acids may be used to remove rust and scale from steel. Strong alkaline cleaners are also generally recommended for cleaning steel. In all cases the cleaned steel should be neutralized, rinsed with water, and dried to obtain a neutral surface.

When cleaning *aluminum* with mild alkaline cleaners, it is recommended that the surface be subsequently neutralized by dipping into acid.

A. Mr. Brams. For brass plate, we recommend grit blasting followed by cleaning and plating according to the plater's preference.

Solid brass is cleaned by dipping into a mixture of equal parts by volume of concentrated nitric and sulfuric acids, to which zinc oxide in the proportion of eight grams per 200 cubic centimeters of total acid has been added. The brass is then washed thoroughly and blown dry.

A. Mr. Puff. When using Durez 12987 for bonding cured or uncured nitrile rubber to metal, the metal surface should be cleaned by sandpapering or sandblasting prior to applying the resin cement.

A. Mr. Smith-Johannsen. Chemical cleaning or sometimes merely degreasing of the metal surface is sufficient when silicones are used.

A. Mr. Cashion. Brass of the easily machinable type, because of its non-uniformity of composition, imposes problems best met by the following procedure:

First, etch in an acid solution consisting of nine parts nitric acid, three parts sulfuric acid, and six parts water by weight. Then wash in sodium carbonate solution made of three ounces of carbonate in 23 ounces of water. The inserts are rinsed in tap water and then stripped in a sodium cyanide bath containing one ounce of sodium cyanide to 32 ounces of water. Following a tap water rinse the parts are dried, and the Loxite 3000 applied hot.

Q. What is the best method of bonding natural or synthetic rubber to cast or sheet magnesium?

A. Mr. Jones. The use of Ty-Ply "3640" or "Q" after a Dow chromic acid treatment is recommended.

A. Mr. Smith-Johannsen. SE 400 series silicone rubber may be bonded to magnesium using SS 67 and SS 15 silicone cements.

A. Mr. Cashion. In procedures involving the use of Loxite 3000, it is suggested that owing to the fire hazard the magnesium inserts be alkali cleansed and then chrome pickled. The Loxite 3000 is then applied as soon after drying as possible.

Q. Is agitation of bonding agents necessary?

A. Mr. Jones. Some adhesives contain dispersed materials; while others do not. It is advisable to agitate all cements before and during use. Ty-Ply should be agitated before and occasionally during use; however, the need of agitation is more critical with Ty-Ply "Q" and "3640" than with Ty-Ply "S" and "BN."

A. Mr. Maassen. Braze is made of two solutions with different specific gravities. On standing the liquids tend to separate into two phases, and it is necessary that these phases be intermixed before use in order to obtain good results. Braze should be stirred at least once each half hour during use, but violent agitation is not necessary. Agitation by rolling the container is not so effective as stirring since it is possible to roll a container without actually mixing the contents.

Q. What is the shelf or container life of these adhesives?

A. Mr. Jones. Under normal storage conditions the container life of all Ty-Plys is at least one year. Precautions should be taken to see that containers are tightly sealed during storage, and occasional agitation, if storage time is prolonged, is recommended. Also, storing at abnormally high temperatures, such as outdoors during summer months or indoors against steam pipes or radiators, should be avoided. If the adhesives are stored below room temperature, the containers should be allowed to warm up to room temperature before the adhesive is thoroughly agitated and removed from the containers for use.

A. Mr. Cashion. No reports have been received regarding the shelf aging of Loxite 3000. Material more than two years old has been used. Painted inserts more than a year old have also been used.

A. Mr. Brams. Thixon bonding agents appear to have excellent shelf stability, with no failures reported due to this factor. One Thixon formulation, which should be refrigerated for prolonged storage, is so marked.

A. Mr. Puff. Durez 12987 is quite stable at normal room temperatures and will keep satisfactorily for at least six months. It is generally advisable, however, to keep any type of phenolic resin in as cool a place as possible, preferably at about 55° F., in order to minimize loss of solvent by evaporation.

A. Mr. Maassen. At the present time we have only six months' history on the storage stability of Braze and find that no deterioration has taken place in that time.

A. Mr. Smith-Johannsen. SS 67 and SS 15 silicone bonding agents will, when properly stored, have a shelf life of at least six months. If the temperature of storage is too high, however, SS 15 will cure to some extent.

There have been some instances where SS 15 has been stored for a long time and difficulty in curing experienced. Normal cure rate may be regained, however, by adding additional catalyst to the material.

Q. What are recommended methods of application for adhesives?

A. Mr. Jones. The cements may be applied by any method which gives an even coat on the metal to be bonded. These methods include brushing, spraying, dipping, and roller coating. A viscosity control should be established for each method of application.

Ty-Plys can be used as received, but must be properly agitated both before and during use. Since they are free-flowing liquids, they need not be heated. Ty-Ply "3640" should not be used below room temperature. Ty-Ply "BN" can be preset on metal at 250° F. in 30 minutes; this temperature will not affect the final bond, even if the "BN" coating is exposed to it for several hours. This feature of "BN" is advantageous when there is an excessive stock flow.

A. Mr. Brams. Since the Thixons tend to be thixotropic, about the only method requiring careful control is dipping, since any slight degree of gellation will not affect the application where the cement is agitated at the moment of application, such as when the cement issues from a spray gun orifice or is brushed on a piece of metal.

Suitable viscosity control is required for a dipping operation, and occasional stirring with proper dilution should be sufficient. Since a reasonable excess of material such as Thixon CB2 will not hurt the bond at a given area, drops of cement on the bottom of a dipped piece are not critical. In fact, in many applications a thick coat of Thixon CB2 will produce better adhesion than a thin one, and for this reason excess dilution should be avoided.

A. Mr. Maassen. A thin uniform of Braze gives the best results. For application by spraying, dilute the cement as required with toluene or xylene.

A. Mr. Cashion. Loxite is heated to 150-170° F. and applied hot. Viscosity is maintained at 42-40 seconds at 150-170° F. (#1 Zahn viscosimeter) by the addition of toluene. For application by spraying, dipping, or roller coating the same temperatures are used, but the cement is maintained at a lower viscosity.

A. Mr. Brams. Thixon CB2 is recommended as a brass-plate adhesion agent, or as an adhesion booster with GR-S, LTP GR-S, or natural rubber stocks. It is used as a one-coat material on a brass plated insert. It is also used as a second coat over a suitable primer material where improved scrap performance is required for a given application. In this respect Thixon CB2 functions as a booster coat and has been used with great success in such two-coat applications where the primer was one of the Thixon primers, or where the primer was a competitive adhesion agent.

It is recommended that this function as a booster be employed wherever undue scrap or excessive variation in quality of bond is encountered with one-coat methods. Using this two-coat construction, it is often possible to eliminate successfully the use of tie gums, especially where the rubber is LTP GR-S and with some special accelerator combinations.

Used as a secondary or booster cement, Thixon CB2 is showing production economies in scrap reduction and reduced overhead in connection with following adhesion operations by technical personnel.

A. Mr. Puff. For applications where uncured nitrile rubber is used, the phen-

olic cement is painted on the metal and allowed to dry long enough to expel the solvent. If the rubber stock will flow, the adhesive coated metal should be partially set by heating 15 to 20 minutes at 225 to 250° F. The uncured stock is then applied, and the entire assembly press cured for a normal cycle.

When cured nitrile rubber is used, the cement is painted on, air dried, and thermoset under pressure at temperatures slightly under the curing temperature of the nitrile rubber stock.

A. Mr. Smith-Johannsen. SS 67 silicone cement may be diluted to 20% by volume in alcohol and then applied by dipping or painting. The adhesive coated metal is allowed to stand about 20 minutes before the rubber is applied. There is no upper limit, however, on how long the surface may stand without being bonded to the rubber, provided the surface is kept clean.

SS 15 cement may be applied in three ways. It may be sheeted out on a rubber mill and placed on the surface to be bonded. Solutions of SS 15 in hydrocarbon solvents may be made, and the adhesive painted on the metal surface; or a glass cloth may be impregnated with the SS 15 in solution; the glass cloth acts as a carrier, and in this way the adhesive is brought into position between the metal surface and the rubber.

Q. Why is brass plate required for adhesion with certain Thixon cements when with solid brass alone, bonds of low quality are produced?

A. Mr. Brams. It appears that adhesion between brass plate and a bonding agent and, in turn, adhesion to the stock, are dependent upon a reaction between the brass and the sulfur from the bonding agent and stock. Brass plate, especially on a grit-blasted metal surface, is far more reactive in such a system than a surface of solid brass, and it appears to be the sulfide material which forms the adhesion bridge. Solid brass may be used with some success in certain systems, but special acid washes must be used to prepare the metal surface.

Certain polymers and stocks can be bonded with a Thixon brass-plate bonding agent by using a bake after applying the cement. Generally such systems are all so particular that solutions have to be worked out on an individual basis, either by the user or by the supplier's laboratory.

Q. How should coated metals be dried?

A. Mr. Maassen. Braze coated metal surfaces should be completely dry before bonding. Thirty minutes drying at room temperature is normally sufficient. Drying temperatures above 212° F. should be avoided as should excessive drying periods at elevated temperatures.

Coated metals may be preheated, but this statement does not imply that metals may be preheated immediately prior to coating since Braze should not be applied while the metal is hot.

Metals coated under humidity conditions varying from 35 to 95% relative humidity show practically no deleterious effects due to the high humidity.

A. Mr. Cashion. The basic advantage in using Loxite adhesive is that the effects on the bond due to humidity are entirely eliminated. Also, a more uniform distribution of the material is possible when the Loxite 3000 is applied hot. Normally this adhesive will dry in 10 to 15 minutes; however, if faster drying is desired, heating the metal inserts to 130-150° F. or heating under infrared lamps should be considered.

A. Mr. Jones. Forced drying methods are not objectionable as long as rapid movement of large quantities of air over the Ty-Ply surface is avoided. This factor is particularly important in the case of Ty-Ply "Q." Certain temperature limitations should also be observed, and generally drying should not take place at temperatures in excess of 160° F. Where high humidity conditions are encountered, Ty-Ply "3640" is recommended in place of Ty-Ply "Q."

A. Mr. Puff. For phenolic cements of the 12987 type, a 15-minute air dry is adequate, but a longer drying time is not detrimental. Good bonds have been obtained after 48 hours of air drying. The important thing is that all of the solvent be removed, and as soon as this removal is accomplished, either by normal air drying or forced drying, good bonds will be obtained.

A. Mr. Brams. Thixon coated parts have been dried successfully with infrared lamps and with forced circulation of warm air. Normal air drying, however, is entirely satisfactory and is usually suggested.

A. Mr. Smith-Johannsen. When SS 67 silicone bonding agent is to be used, the drying time is about 20 minutes, and heat should not be used. When SS 15 is used from solution, drying should not be forced at temperatures over 50° C.

Q. Are cover cements necessary?

A. Mr. Maassen. If Braze coated metal parts are to be used within 24 hours, no cover cement is normally necessary. If they are to be stored for longer than 24 hours, a protective coating of cement should be used.

For best results these cements should be made from approximately 60 Shore durometer hardness stocks. A petroleum naphtha solvent with a specific gravity of 0.70 to 0.72, which contains no residual oils, is recommended for the preparation of natural rubber and GR-S cements. For neoprene cements a solvent mixture of 40% toluene as an aromatic hydrocarbon and 60% Troluoil as an aliphatic hydrocarbon is recommended.

A. Mr. Jones. Ty-Ply adhesives provide no building tack, and a tie cement should be used where building tack is required. It should be pointed out, however, that in most applications Ty-Ply requires no tie cement for satisfactory adhesions.

A. Mr. Cashion. In many cases a cover cement such as Loxite 1055 is used over Loxite 3000 to enhance the adhesion of low durometer compounds. Also, in some applications, the cover cement is used as an insurance against contaminating the Loxite 3000 primer coat during storage of the inserts. Some operations require the use of a tacky cover so that the assembly can be built up before being inserted into the mold. Some elastomers, such as butyl and neoprene, under certain conditions need a special cover cement to obtain the best adhesion.

A. Mr. Brams. Thixon B series cements are used extensively as cover cements with excellent results.

A. Mr. Puff. Generally speaking, cover cements are not used with phenolic-type adhesive cements.

Q. What are the recommended methods for curing rubber-to-metal assemblies?

A. Mr. Jones. Assemblies are mostly press cured, but open heat cures, either dry or steam, give very satisfactory bond strengths. Excellent bonds can be obtained in injection or transfer molding operations using Ty-Plys.

A. Mr. Maassen. Braze assemblies are cured under pressure at temperatures from 280 to 350° F. For best results, temperatures above 350° F. should be avoided, while at the same time, although bonds may be obtained at 260° F., curing temperatures under 280° F. are not recommended. If it is necessary to cure at temperatures below 280° F., longer curing times will improve the bond. On the other hand, cures have been made in boiling water at atmospheric pressures and have resulted in very good bonds.

A. Mr. Puff. The normal temperatures and pressures used in rubber molding are adequate for bonding nitrile rubber and metal with a phenolic cement. Just enough pressure to insure uniform contact will give a good bond, but stronger bonds are obtained as the pressure is increased.

A. Mr. Smith-Johannsen. The temperature of cure for silicone adhesives must be over 212° F., and the time of cure above 212° F. becomes progressively less. Depending on the type of application, the cure time may vary from as much as 20 minutes to as little as four seconds. Oven cures are not always required although 30 minutes at 300° F. usually tend to strengthen the bond.

Elastomeric silicone adhesives require essentially only contact pressure for a good bond; 5-10 psi is often sufficient to insure a dense bond. Although in some special laminating applications the best pressure has been found to be as high as 125 psi, when molding to a metal insert, the pressure should be as low as possible.

A. Mr. Cashion. Successful adhesion has been obtained with Loxite 3000 at temperatures as low as 254° F. and as high as 340° F.

Q. What is the effect on bond of different methods of loading the stock and inserting it into the mold?

A. Mr. Jones. Flow of stock across the cemented surface on the way to the flash groove should be avoided—the flash groove should be kept away from the adhesion area. The use of carefully weighed pellets is always an economy.

The question of where to assemble the part—whether to build the rubber and metal parts into an assembly before the press line or at the press—is pretty much dependent upon preference and layout in the plant using the material.

A. Mr. Brams. Thixon coated inserts can be handled quite freely without damaging adhesion, and some users prefer to drop the cemented insert into the cavity at the press line, following with the pellet of stock and the other insert, if there is another. In general, however, the loading problem is something which is best worked out by the user in his experimental mold for a given part.

A Mr. Cashion. We believe it is practically impossible to wipe the Loxite 3000 off the metal once it has properly dried. Even aromatic cover cements can be used if the inserts are heated 15 minutes at 158° F. before use.

Q. What general rules should be observed when compounding a rubber stock for adhesion jobs?

A. Mr. Jones. It has been found that medium hardness stocks generally give the best adhesion. Any constituents that may bleed or bloom, such as stearic acid, waxes, lubricants, or plasticizers, should be avoided or at least kept to a minimum. Pure gum and non-black stocks are difficult to bond although 30-40 durometer hardness stocks are being bonded.

A. Mr. Brams. Generally speaking, average sulfur doses produce the best bonds. Low sulfur will often give a satisfactory bond, but it is not recommended. Sulfur-

less cures should generally be avoided. Extremely high sulfur cures, such as in semi-ebonites and ebonites, produce stocks which do not bond with Thixon. These remarks apply primarily to GR-S and natural rubber adhesions, but they also apply substantially to other polymers bonded with the appropriate Thixon. Although Thixon CB2 is quite tolerant of various accelerators and combinations, it works best with the thiazole and thiazyl types. High thiuram content or all thiuram acceleration should be avoided.

A. Mr. Cashion. Loxite 3000 has been used to bond sulfurless compounds to steel with very good results, as measured by the ASTM adhesion test.

A. Mr. Smith-Johannsen. Silicone rubber stocks should be thoroughly freshened before being molded to metal.

Q. What are the service temperatures to which assemblies bonded with various adhesives may be subjected?

A. Mr. Jones. Continuous exposure to elevated temperatures should be limited to 250° F.; while brief exposures to 300° F. are permissable for Ty-Ply "Q" and "S" assemblies. When bonded with Ty-Ply "BX," assemblies can be exposed to temperatures up to 375° F.

Continuous exposure to low temperatures does not affect materially Ty-Ply "Q" or "S" bonded assemblies. As long as the rubber compound retains a certain amount of resilience, exposure to as low as —70° F. is entirely feasible. For Ty-Ply "BX" bonded assemblies, exposure to temperatures as low as —40° F. is not considered to affect the bond adversely.

A. Mr. Cashion. Loxite 3000 bonded inserts have been tested dynamically above 300° F. and found satisfactory.

A. Mr. Smith-Johannsen. The heat resistance of silicone-metal assemblies is limited only by the rubber itself, and we consider 500° F. to be a reasonable service temperature.

Q. Do these adhesives give bonds which are resistant to water, oil, solvents, and heat?

A. Mr. Brams. For general use, Thixon cements are suitable in water and oil and are solvent and heat resistant in accordance with the stock in use. For severe service conditions involving water, a brass-plate construction with an appropriate Thixon brass-plate cement is used.

A. Mr. Maassen. Braze gives a water resistant bond. Its resistance to solvents is generally better than that of the polymer being adhered to the metal. Braze is more resistant to aliphatic solvents than to the aromatics. Its heat resistance is good; it is not thermoplastic and, when tested at temperatures up to 100° C., shows little or no loss in bond strength. Poor breaks are obtained primarily because of the weakening of the polymer at elevated temperatures.

A. Mr. Jones. Bonds formed with Ty-Ply age well, but it is recommended that bonds not be subjected to dynamic stresses for the first 24 hours after cure. On continuous exposure, aromatic solvents, ketones, and esters will slowly affect the bond strength, as the rubber itself is affected. The same is true when neoprene assemblies are exposed to water, because of the action of moisture on neoprene itself.

In general, all bonds are at least as resistant to these various agents as the rubber stocks themselves.

Ty-Ply "BX" is a notable exception to the above statement. "BX" bonds are very resistant to all common solvents except possibly acetone, since it is insoluble after curing.

A. Mr. Puff. Phenolic cements, when properly cured, show excellent resistance to water, oil, solvents, and heat.

A. Mr. Smith-Johannsen. We have considerable information on the effect of water, oils, and solvents on silicone rubbers. In some cases where the rubber is known to swell substantially under the effect of a given solvent, a bond of the same rubber to a solid surface, such as aluminum, remains virtually unaffected. Therefore elastomeric silicone adhesives may be used in applications where they would not be expected to work, based on the properties of the bulk material.

There are a number of adhesives on the market with excellent water resistance. But how many adhesives will stand continuous freezing and thawing in contact with water, or how many will withstand continuous exposure to boiling water? Under such extreme conditions silicone adhesives are outstanding.

If either high-temperature resistance or low-temperature flexibility is desired, then no better choice of an adhesive than a silicone could be made.

A. Mr. Cashion. Loxite 3000 is being successfully used to bond neoprene to steel and aluminum. In many cases Butaprene has been bonded with Loxite 3000.

Q. Has there been any failure of bonds due to corrosion, etc.?

A. Mr. Jones. To my knowledge there have been no bond failures due to corrosion where Ty-Ply cements were used.

A. Mr. Brams. We have no reports of bond failures due to corrosion where Thixon bonding agents were used.

A. Mr. Puff. To the best of our knowledge there have been no bond failures with Durez 12987 that were due to corrosion.

A. Mr. Smith-Johannsen. No corrosion of metal was observed when silicone rubber had been bonded to it, except where the choice of the rubber stock was poor.

Q. Which of these adhesives can be for adhering vulcanized rubber to metal?

A. Mr. Jones. Cured neoprene and GR-S can be adhered to metal by using a neoprene tie cement over Ty-Ply "S." Cured nitrile rubber compounds can be adhered to metal with Ty-Ply "BX."

A. Mr. Puff. Nitrile rubber compounds can be adhered to metal by applying a phenolic cement to both the nitrile rubber compound and the metal, followed by air drying and thermosetting under pressure at temperatures slightly under the curing temperatures of the nitrile rubber compound.

A. Mr. Smith-Johannsen. Silicone adhesives are useful in bonding silicone rubber to other surfaces or to itself, as well as in bonding together any of many combinations of solid surfaces. Presently available silicone adhesives have not been found useful, however, in bonding most other types of natural and synthetic rubbers.

At the present stage of development, silicone adhesives are not so strong as many of the conventional adhesives at ordinary temperatures, but even though the bond strengths are limited by the strength of the silicone elastomers themselves, failure occurs in the stock itself. The true value of such bonds is in their performance and resistance to destructive influences.

Q. What plastic surfaces will these adhesives bond?

A. Mr. Smith-Johannsen. Silicone adhesives will bond to silicone, polyester, phenolic, and melamine resins. Under special conditions it is even possible to bond polystyrene.

A. Mr. Jones. We have reported uses in which Ty-Ply "S" and "BX" are used to bond neoprene and nitrile rubber compounds to phenolic impregnated fabrics.

A. Mr. Puff. As previously mentioned, nitrile rubber solvent-type cements modified with phenolic resins have proved extremely satisfactory for bonding almost any type of material. This point is even true if one or both of the surfaces to be bonded are hard and non-porous as is the case with most plastic surfaces. Satisfactory bonds have been obtained with such materials as polyester, phenolic, melamine, and even vinyl surfaces. It might be pointed out again that one of the major uses of this type of cement has been the bonding of vinyl compounds.

Q. What test methods are recommended for evaluating rubber-to-metal adhesive bonds?

A. Mr. Jones. The most widely accepted methods at present are those of ASTM D-429, Methods A and B, or modifications thereof.

Method A, which tests a metal-rubber-metal sandwich construction in tension is used more widely than Method B, which is a strip test. Many objections have been raised recently against Method A since it does not give an accurate analysis of the adhesive bond, but instead tests the strength of the rubber stock.

Method B is rather cumbersome to use, but a strip test, in general, does give a more accurate analysis of the adhesive bond to both the rubber and the metal.

A method developed in England analyzes adhesion by use of an impact tester.

An ASTM subcommittee is now actively engaged in reviewing current and proposed test methods in order to develop relatively simple tests which can be run in any laboratory and appraise rubber-to-metal bonds more accurately.

A. Mr. Brams. We place great reliance on the cut-and-strip method. We have an inexpensive mold, and by using sections of hot rolled strip steel, the insert cost is very low. We mold a finished piece about 4 by 1 by ½-inch in size, with a 3 by 1 by 3/16-inch metal insert included. The stock is pulled away from the metal, and whenever tearing in the stock occurs, the latter is cut back to the metal with a knife. The percentage areas remaining showing rubber rupture, showing cement, and showing metal are estimated to give us a permanent record.

Of course a good stock must be used to make the test tell anything about the adhesion method. We feel that top-quality adhesion will show up high on either test, but feel that the cut-and-strip method may perhaps be better for evaluating a bond which may be somewhat less than the best. Recent work in impact testing shows promise of contributing to our knowledge of adhesion testing, and one leading technologist has expressed the opinion to me that the cut-and-strip method embodies some of the elements of the impact method, while the tensile method is far less similar. It is generally true, however, that a bond system which shows up exceptionally well in a tension test will show up well in other tests, as well as in practical service.

Exhibits of Adhesives

In a statement at the end of the transcript the Chicago Rubber Group acknowledged with thanks the cooperation of all of the panel members and The B. F. Goodrich Co. for the installation of exhibits illustrating the latest developments in adhesion of rubber to metal. These exhibits staffed by technical experts afforded an opportunity for those attending the meeting for discussion of specific problems.

New Polymel Resin

THE development of a new light-colored, oil-resistant powdered resin, Sublac PX-5, that exhibits some unusual properties in rubber compounds has been announced by Polymel Corp., 1800 Bayard St., Baltimore 30, Md. When used in combination with Polymel C-130 in GR-S and natural rubber sole stocks, the new material is said to eliminate the need of zinc oxide and accelerators. Despite the lack of accelerators in such stocks, it is claimed that optimum cures can be obtained in 10 minutes at 325° F. One test stock cured in this manner is reported to have shown a tensile strength of 1,200 psi., elongation of 250%, modulus at 200% of 990 psi., and a hardness of 81.

Sublac PX-5 is also said to impart a preservative effect to unvulcanized neoprene compounds, thereby preventing setting-up. Although some acceleration is required with neoprene stocks, the new resin is claimed to aid processing and generally improve physical properties. Ten parts of the resin on the rubber act as an accelerator in all non-black neoprene compounds and prevent scorch during processing or bin storage.

Tire Requirements Discussed

A TALK on "What the Automotive Engineer Demands of a Tire," by Kenneth A. Stonex, General Motors Corp., highlighted the January 8 dinner-meeting of the Ontario Rubber Section, C.I.C., held at the Collins Hotel, Dundas, Ont., with some 41 members and guests attending.

Close collaboration of automotive and tire development engineers is desirable for the improvement of auto tires, Mr. Stonex declared. A review of the history of the auto tire shows a continual striving for greater dependability and longer service. Average tire mileage has increased from about 3,000 miles to 30,000 miles and higher, with the increase obtained at much higher speeds. At the same time, tire pressures have dropped from about 60 pounds per square inch to the present low-pressure tires operating at about 24 p.s.i. The reduced pressures contribute to smoother riding, but steering, drag, and other features are adversely affected. Using a series of slides, the speaker discussed the tests used to evaluate tire behavior. Some of the improvements in tires looked for by the automotive engineer are better steering response and increased traction on snow and ice.

IRI Foundation Lecturer

R. P. DINSMORE, vice president of Goodyear Tire & Rubber Co., Akron, O., has accepted an invitation from the Midland Section, Institution of the Rubber Industry, to give the Institution's seventh annual Foundation Lecture. Dr. Dinsmore wil speak on "Economic and Physical Aspects of GR-S Modifications." The Lecture and dinner will be held on May 23 at Wulfrun Hall, Wolverhampton, England. Further information as to accommodations and other particulars may be obtained from the secretary of IRI, 12 Whitehall, London S. W. 1, England.

Bureau of Ships Rubber Formulary Revised

A CONSIDERABLE number of supplements and revisions to the Bureau of Ships Rubber Formulary have been prepared and issued since the availability of this compilation was announced in our April, 1951, issue, page 81. It should be emphasized that this information has been prepared for the assistance of manufacturers who are engaged in or contemplate production of rubber products for use by the Department of Defense.

The new formulations have been sent to most of the rubber manufacturers who received previous issuances. Any holder of earlier issues of the formulations can check his present collection against the revised list of currently active formulations which is given below. Requests for individual formulations from this list should be addressed to the Chief, Bureau of Ships, Code 344, Navy Department, Washington 25 D. C.

Index No.	Stock No.	Specification	Description
		Military	
72	E-13-381	MIL-R-880	Gaskets, door and hatch
73	E-13-383	MIL-R-880	Gaskets, door and hatch
43	E-162-1100, -1472	MIL-R-900	Gaskets, non-oil resistant, for -35° F.
44	S-3-11, E-162-1488	MIL-R-900	Gaskets, non-oil resistant, for -35° F.
25	E-163-181	MIL-H-2218, Cl. I	Hose, submarine chamber
	E-163-179	MIL-H-2218, Cl. III	Hose, submarine chamber
81	S-8-2	MIL-P-15817	Battery ventilator duct sleeves
65	C-13-1, N-18-1	MIL-S-15058	Covering for solid shafts
		Navy	
8	E-222-21, 52, 53	HVI (MIL-V-2741)	Pump valves
12	E-40-85	27M13 (MIL-M-2828)	Matting
14	E-194-15, -180	33G7 (MIL-G-2765)	Gaskets, oil resistant
45	E-155-37, E-163-458	33G9	Cloth insert gaskets
46	E-33-7, -8	33G9	Cloth insert gaskets
17	E-69-96	33G10	Gaskets, cold storage
19	E-225-15	33G14 (MIL-G-2810)	Gaskets, rubber tubing
52	E-163-448	33H4	Hose, oil and gasoline, wire-stiffened
58	E-163-448, -458	33H5	Hose, suction, water
68	E-163-448	33H12 (MIL-H-20242)	Hose, vacuum
59	E-163-448, -458	33H18 (MIL-H-2864)	Hose, floater, non-metallic
60	E-163-448, -458	33H21	Hose, oil and gasoline, light weight
61	E-163-448, -458	33H23	Hose, oil and gasoline, light weight
49	E-163-448, -458	33H25 (MIL-H-2699)	Hose, pneumatic, wrapped
56	E-163-448, -458	33H27	Hose, water, braided and wrapped
62	E-163-448, -458	33H28 (MIL-H-2768)	Hose, fuel, buoyant, unarmored
63	E-163-448, -458	33H29 (MIL-H-2816)	Hose, fuel, armored
51	E-163-448, -458	33H30 (MIL-H-2817)	Hose, suction-discharge, wire-stiffened
28	N-8-3, C-4-5, C-4-7	33L4 (MIL-L-2912)	Lining, submarine battery compartment
35	C-22-1, D-12-4	33R7	Cement for shaft covering
	H-6-4	33R7	Base stock for shaft covering
	S-11-2	33R7	Face stock for shaft covering
64	E-163-446	33R11	Gaskets for gasoline tanks
		Joint Army-Navy	
47	E-163-446	JAN-G-1086	Gaskets for gasoline tanks
67	E-162-1609	JAN-R-1149	Gaskets and packing
70	E-156-575	JAN-R-1149	Gaskets and packing
82	E-34-177	JAN-R-1149	Gaskets and packing
83	E-194-542	JAN-R-1149	Gaskets and packing
		Federal	
69	E-162-1609	HH-G-156	Gaskets
71	E-156-575	HH-G-156	Gaskets
84	E-194-542	HH-G-156	Gaskets
53	E-163-448, -458	ZZ-H-421	Hose, chemical
54	E-163-448, -458	ZZ-H-428	Hose, coolant system
48	E-163-448, -458	ZZ-H-499a	Hose, pneumatic, wrapped
1	E-204-9	ZZ-H-541	Hose, steam
50	E-163-448, -458	ZZ-H-581a	Hose, corrugated (locomotive tender)
55	E-163-448, -458	ZZ-H-601	Hose, water, braided
57	E-163-448, -458	ZZ-H-611	Hose, water, wrapped
2	E-308-16	GGG-H-86	Hammer heads
66	E-308-13	GGG-H-86	Hammer heads
		Miscellaneous Non-Specification Uses	
3	E-30-5		Diesel engine gaskets (neoprene)
4	E-194-269, -270		Diesel cylinder liner gaskets
5	E-13-314		45-Durometer gasket stock
6	E-20-35		Neoprene gaskets
7	E-276-31		O-ring packing
15	E-9-236		Gaskets, oil resistant, for low-temperature use
74	R-28-1, R-30-1, R-31-1, R-32-1		Gaskets, natural rubber
75	N-6-4, C-5-4		Battery ventilator duct lining
77	E-194-442		Gasket, non-staining
78	E-163-416, -420		Gasket for exposure to aviation fuel
79	E-316-1		Diaphragm
80	S-14-2		Scupper lip

Additional Experimental GR-S Polymers and Latices

THE table below gives the additions and changes in the list of experimental GR-S polymers and latices authorized by the Synthetic Rubber Division RFC, during the period from November 27 to December 14, 1951.

Normally, experimental polymers will be produced only at the request of the consumers, and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside, if possible, for distribution to other interested companies for their evaluation. The 20 bales, when available, will be distributed in quantities of one bale or two bales upon request to the SRD Sales Division, or will be held for six months after the experimental polymer was produced, unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received.

These new polymers are experimental

only, and SRD does not make any representations or warranties of any kind, expressed or implied, as to the specifications or properties of such experimental polymers or the results to be obtained from their use.

X-Number Designation	Polymer Description	Remarks
	Change in Previously Announced Polymer	
X-663 GR-S	Shortstopped with sodium dimethyldithiocarbamate plus adjunct (sulfur or polyamine).	The base polymer in X-663 GR-S is polymerized in the sugar-free formula with dinitrochlorobenzene as the shortstop. Since it has been found that dinitrochlorobenzene in the absence of sugar may induce dermatitis, the shortstop sodium dimethyldithiocarbamate, generally considered non-toxic, has been substituted for dinitrochlorobenzene.
	New Polymers and Latices	
X-691 GR-S	A masterbatch of 40 parts naphthenic processing oil (Circosol-2XH), 77 parts HAF black (Philblack 0), and 100 parts of base polymer. The base polymer is identical with GR-S-101, except the reactor Mooney viscosity is 125 (ML-4). Stabilizer is 1.25% BLE on the polymer. The oil is emulsified with oleic acid, and the oil emulsion and carbon black slurry are pre-mixed prior to coprecipitation with latex.	This oil-extended carbon black masterbatch is formulated in such a way that a fatty acid (oleic) will be present in the finished product in the amount of one part per 100 parts polymer. In the pilot plant the technique of premixing the oil emulsion and carbon black slurry prior to coprecipitation with latex has resulted in lower than usual compounded viscosity. This may indicate slightly improved processing. The higher carbon black loading (77 parts, as against the normal 50 parts) should give improved physical properties.
X-692 GR-S	A masterbatch of 40 parts of naphthenic processing oil (Circosol-2XH) and 100 parts of the base polymer in X-691 GR-S.	This oil-rubber masterbatch is designed as a control polymer to determine the influence of carbon black in the evaluation of X-691 GR-S. In applications where the presence of some fatty acid is desirable in compounding, this polymer may be useful since it is designed to contain one part of oleic acid per 100 parts of polymer.
X-693 GR-S	A masterbatch of 25 parts naphthenic processing oil (Circosol-2xH and 100 parts of a base polymer. The base polymer, containing approximately 20% bound styrene, is polymerized at 41° F. in the iron-pyrophosphate, organic hydroperoxide activated system. The emulsifier is a 50/50 mixture of rosin acid and fatty acid soaps, and the shortstop is sodium dimethyldithiocarbamate plus adjunct (sulfur or polyamine). The oil-rubber masterbatch is stabilized with 1.25% Wingstay S on the polymer. Raw Mooney viscosity of the masterbatch is approximately 65 (ML-4).	X-693 GR-S is intended to be a non-staining, non-discoloring oil-rubber masterbatch for general-purpose use. It is designed to provide an oil-rubber masterbatch for use in those applications where staining and discoloration are problems. Except for the substitution of a non-staining antioxidant (Wingstay S), this masterbatch is identical with X-628 GR-S (a general-purpose oil-cold rubber masterbatch).

T. C. Rubber

AT A recent meeting in Holland, the International Rubber Research Board reveiwed the progress made during 1951 in supplying Technically Classified Rubber from the Far East.

Although the present world output of T. C. Rubber is of the order of 20,000 tons a year, the material is at present available only in the RMA grades RSS 1X, 1, and 2. The Board realizes that consumers of natural rubber cannot take full advantage of this new and important development unless the rubber can also be offered in the other main RMA grades.

IRRB in a recorded resolution stated that it realized that this expansion stated other main RMA grades will require appreciable expenditure by producers on test stations, and some improvement in the present arrangements for obtaining a uniform product, such as blending of field latex prior to coagulation and of solid rubber during the packing of bales, or during the remilling process, but that such expenditures will be indispensable.

Glen E. Meyer, Latex & Rubber, Inc., Baltimore, Md., in a letter to India Rubber World has pointed out that there seems to be considerable misunderstanding regarding the purpose of T. C. Rubber and the procedure to follow to obtain the greatest advantage from the use of this-type rubber. The distribution of the first lots received in this country indicates the buyers are buying "particular marks," which was not the intention of the producers for this early stage in the development of T. C. Rubber.

A shipment of T. C. Rubber to this country, though made up of only one RMA grade, will normally contain several estate production lots and will therefore have several technical classes. It is not possible properly to evaluate these classes of T. C. Rubber by sampling or using only one or two bales of each class.

The advantages of T. C. Rubber can be best exploited by the user not attempting to purchase a particular mark, but by purchasing a lot, on the basis of its RMA grade, which has been technically classified.

Rubber in Wire and Cable

A TALK on "Rubber in Wires and Cables," by John T. Blake, Simplex Wire & Cable Co., featured the January 17 meeting of the Elastomer & Plastics Group, Northeastern Section, American Chemical Society. The meeting was held at Massachusetts Institute of Technology, Cambridge, Mass., with 46 members attending. In the brief business session preceding the talk it was announced that the Group now has 80 members, of whom 67 are regular A. C. S. members and 13 are associate members.

Dr. Blake said that synthetic rubbers have a great future in the field of wire insulation because of their individual properties. Already used to a greater extent in this field than in any other, synthetic rubbers should soon displace most of the natural rubber now being used in wire and cable. The speaker dealt with the properties of the various synthetic rubbers that are of value in wire insulations, including moisture sensitivity, electrical characteristics, toughness, and service life. The need of small changes in properties with temperature variations, and the use of non-black stocks for certain applications also were discussed. Dr. Blake gave special attention to the properties of butyl, neoprene, and GR-S for solving specific wire insulation problems, including the special problem of microbial decomposition, which has been studied in much detail.

Patent Abstract Service

THE inauguration of a new patent abstract service has been announced by Picturesort Co., 246 Church St., New Haven 10, Conn. The service consists of photographic copies of patent abstracts, as issued in the *Official Gazette* of the United States Patent Office. Supplied weekly, the subscriber receives only the class, sub-class, or type of patent in which he is interested. Abstracts are reproduced full size on four- by six-inch cards punched to any desired coding system.

Vinyl Plastigels

(*Continued from page 589*)

handled with lighter weight equipment than is used in conventional molding and extrusion of similar plastic materials. Since high-pressure, heavy-duty machinery is not required, available equipment can be adapted easily and quickly for processing plastigels. Because of the low temperature required for fusing, ordinary ovens may be used.

The new formulation is based on Vinylite dispersion resins, plasticizer, an additive of Bentone-34, and other modifiers and colorants. When properly mixed, these components provide the putty-like material. Bakelite will supply customers with the basic resins and the technical information required to formulate the plastigels.

New Fluorinated Resin

VELOFORM F-10, a new fluorinated resin said to be resistant to the most highly corrosive chemicals and impervious to salt, heat, and moisture, has been announced by Firestone Tire & Rubber Co., Akron, O. According to Raymond C. Firestone, vice president in charge of research and development, the new resin has been specified by the Air Force as a protective coating for the exteriors of large tank trailers used in transporting fuming nitric acid.

In comparison with other materials of its type having the same acid, heat, and moisture vapor resistance, Veloform F-10 can be applied as a lacquer. Application can be done by means of brushing, spraying, or dipping, and the resin can be used on metals, wood, plastics, and rubber-like products. Its high moisture vapor resistance makes the new resin an ideal coating for electrical equipment which must be protected from moisture and salt spray. Current production of the new resin is being used entirely for military and defense purposes.

NEWS of the MONTH

President Recommends Butyl Plant Disposal; Natural Rubber Importation by Industry in Third, 1952, Quarter Possible

The President's report to Congress on synthetic rubber, required by January 15 by the Rubber Act of 1950, urged disposal of the government-owned butyl rubber plants to private industry and a continuation of the 1950 Rubber Act for another two years. The report also included the first official announcement that the importation and distribution of natural rubber would most likely be returned to private industry by the middle of the present year.

A report of the Reconstruction Finance Corp., for the fiscal year ended July 1, 1951, included in its section on rubber activities figures for sales income on synthetic rubbers for fiscal 1951 and estimated 1952 at more than $500 million. A fourth plant will begin producing GR-S black masterbatch by July 1, 1952, and RFC said it believed "the production of oil-extended GR-S will become a large factor in the synthetic rubber program."

The first-quarter quota for GR-S export was increased from 10,000 to 17,000 long tons in late January.

The General Services Administration is working on plans for the return of natural rubber importation and distribution to private industry, and a detailed announcement is promised by April 1. The government's price for #1 RSS was reduced from 52¢ to 50.5¢ a pound on February 1.

The President's budget revealed that the government's buying and selling of natural rubber for the fiscal year 1952 was an $800 million operation.

Harry D. Brown, Gates Rubber Co., was named deputy director, Rubber Division, NPA, on January 22.

The Office of Price Stabilization established machinery for rubber goods manufacturers to apply for ceiling price increases under the so-called Capehart Amendment.

The Federal Trade Commission issued a quantity discount limit rule to govern manufacturers' sales of tires and tubes, to become effcetive April 7, and to limit to a carload quantity of 20,000 pounds ordered at one time as the maximum quantity which may be used to justify price differentials on automotive replacement tires and tubs.

P. W. Litchfield, chairman of the board, Goodyear Tire & Rubber Co., recommended that the government invest $100 million in 300,000 acres of natural rubber plantations in the Western Hemisphere in order to provide for a "living" stockpile of rubber for national security.

John L. Collyer, president, The B. F. Goodrich Co., again objected to the U. S. entering into any long-term fixed price agreements on natural rubber.

A review of the plastics raw material supply situation indicated that the outlook for 1952 was generally optimistic and that the production of synthetic resins from which plastic products are made would amount to 2.6 billion pounds in 1952.

A strike at the Willoughby, O., plant of the Ohio Rubber Co., begun in October, was still unsettled in mid-January.

Washington Report

By

ARTHUR KRAFT

Rubber Act Report

President Truman has asked Congress for authority to dispose of the two government-owned butyl rubber plants to private industry. He so recommended in a report transmitted to Congress on January 14. In the same report, required by the Rubber Act of 1950, the President recommended that Congress terminate the government's authority to require the consumption of butyl rubber.

The President recommended that existing sections of the law pertaining to GR-S be continued unchanged for two years beyond June 30, 1952, the date at which the Rubber Act of 1950 will expire.

"It is my conclusion," he told Congress, "that disposal of GR-S facilities should be temporarily deferred."

While much of the 1,700-word message to Congress was devoted to justification of the butyl plant disposal recommendation, the President touched briefly, but importantly, on the progress of natural rubber stockpiling.

The progress has been "substantial," he said. "Our minimum objectives will soon be met, and if international conditions do not worsen, it may be possible to begin soon to taper off our stockpile purchasing of rubber."

This statement was the first public pronouncement that the government intends to slow down the pace of its stockpile buying once the critical stage has been reached. Such action would conform to the desires of the rubber goods manufacturers, as expressed in January in a letter to General Services Administrator Jess Larson. This critical stage—or "peril point" as the industry calls it—is expected to be attained with the first- or second-quarter, 1952, deliveries. How long the government plans to take to attain the maximum stockpile goal is not even being guessed at.

The butyl plant disposal recommendation, while always under consideration by those officials doing the spadework on the President's report, came as somewhat of a surprise. While official confirmation is lacking at this point, it is generally believed that Chairman Vinson of the House Armed Services Committee and Senator Johnson, chairman of the Senate Armed Services Preparedness and Rubber subcommittees, had expected no more than a recommendation for a two-year extension of the 1950 Rubber Act, and without change.

They had hoped to introduce a simple resolution in each house of Congress for such an extension, bypassing customary public hearings. The surprise butyl recommendation, however, may bring about hearings and might have been made with that purpose in mind.

The President is still holding back from Congress a recommendation of his rubber advisers asking Congressional authority to construct additional special-purpose rubber facilities, meant to include up to 40,000 long tons a year of additional butyl. This recommendation will be dealt with "separately," a White House official said. This cryptic explanation has been taken to mean that the plant construction request will go to the Hill if and when it becomes certain that Congress will refuse disposal authority. Apparently, there is little risk that Congress will refuse the government authority to add to its existing butyl capacity, since the Preparedness subcommittee, in its last report on rubber, specifically invited the President to seek such authority and promised its aid to get speedy Congressional approval and funds.

The President rested his case for disposal of the butyl plants on two points: (1) Butyl is in a strong position to compete with natural rubber because it has been accepted by industry as at least the equal in quality for inner tubes and other uses, and this acceptability will not diminish should natural rubber again become available to industry in large quantities and at low prices; and, (2) demand for butyl now greatly exceeds supply, and demand prospects point continually upward. More butyl than current facilities can turn out should be available. Private firms are reluctant to put up butyl plants, however, under existing conditions which would force them into competition with the government operating on a "no profit-no loss" basis. Disposal of two existing plants (their combined capacity is 80,000 long tons a year) would "create circumstances which would stimulate private business interest in building additional facilities," the President advised Congress.

Neither of these arguments, the President said, can at present be properly applied to GR-S. Also, he noted, the complex of GR-S and feedstock facilities are operated as an integrated unit by the government with resultant efficiencies and economies which would be sacrificed were the plants divided among several competing private firms. Each of the two butyl plants, on the other hand, is operated as a separate and integrated unit.

The President noted that butyl research, which is "entirely privately financed," has turned out a number of new applications for this lowest priced of rubbers. He singled out the "very promising results which could result in a many-fold increase in demand for butyl" which have been yielded from research on all-butyl passenger-car tires. The results of this development are still a closely guarded company secret, but those who have seen reports on the all-butyl tire regard it as most promising. The butyl tire is said by some to be superior to tires made of cold GR-S.

In recommending disposal of the two butyl facilities, it was suggested that disposal be authorized according to the general principles outlined in the "Steelman Report" made to Congress in January, 1950. These principles called for security safeguards and safeguards to prevent a private monopoly in synthetic rubber. The two butyl facilities are each of 40,000-tons-a-year production capacity. One, at Baton Rouge, La., is operated by Esso Standard Oil Co., and the other, at Bay-

town, Tex., is operated by Humble Oil & Refining Co. Both companies are subsidiaries of the Standard Oil Co. of N. J.

The President told Congress that the Defense Department had advised him that the national security will be fully protected "under either alternative—disposal with security safeguards or continued government ownership."

RFC Rubber Reports

In the annual budget transmitted to Congress on January 21 the President reported that government sales of synthetic rubber are expected to total $521,491,000 in the fiscal year ended June 30, 1952, and rise to $555,570,000 the following year. Sales in the year ended last June 30 amounted to $298,143,047, according to the section of the budget covering the RFC.

RFC's purchases and processing costs (the costs of synthetic rubber production) amounted to $257,800,000 in the year ended last June 30 and are estimated at $439,000,000 in the current fiscal year and at $475,800,000 in the fiscal year beginning July 1, 1952.

In support of these figures, the budget said: "It is expected that an annual production rate of 950,000 long tons will be reached by the end of fiscal year 1952 (July 1, 1951, to 1952) and be maintained throughout fiscal year 1953."

RFC contemplates capital expenditures of $31 million in the current year and of $20 million in the year beginning July 1, 1952. In the past fiscal year, capital expenditures amounted to $12,566,712. Part of the increase will result, the budget report stated, from measures taken to increase LTP[1] GR-S output to 75% of the total.

The 950,000-ton annual production level foreseen by this July will reflect current steps to bring GR-S production to 860,000 tons and butyl production to 90,000 tons, RFC noted in its annual report, issued over the Christmas holidays.

The President's budget, a synthesis of the RFC statement, estimated the agency's net income from rubber sales at $17,611,000 in the current fiscal year and at $13,586,000 in the year following. In fiscal 1951, net income totaled $11,927,793. In the previous year, RFC's rubber program ran $1,794,621 into the red.

Highlights of the RFC annual report's section on rubber activities in the past year were:

On June 31, 1951, RFC had in operation 28 of the 51 facilities which constituted the wartime synthetic rubber program. A year earlier, 17 plants were in operation. At the end of fiscal 1951, the 28 plants in operation lucluded 13 copolymer plants, 2 butyl plants, 10 butadiene plants, one styrene plant, one chemical plant, and one development laboratory. The 11 added during the year included five copolymer plants and six butadiene plants.

During fiscal 1951, RFC produced 528,841 long tons of GR-S and 65,625 long tons of butyl, 429,900 short tons of butadiene and 36,100 short tons of styrene. By the end of the fiscal year, work was well under way on expansion projects toward the 950,000-long-ton rubber goal. Conversion of copolymer facilities to LTP GR-S resulted in boosting the annual rate of this type from 183,000 long tons to 280,000 long tons by June 30. Further conversion to a 75% LTP GR-S goal was under way by the end of calendar 1951. RFC said the "outstanding abrasion resistant properties" of LTP GR-S "make it markedly superior to natural rubber for use in tire treads."

In the past fiscal year RFC produced LTP GR-S at eight copolymer plants, turning out 195,344 tons in that 12-month period. Three copolymer plants produced 124,645 tons of black masterbatch, some of it as LTP GR-S. To meet increasing demands RFC was preparing to produce black masterbatch at a fourth plant at the close of the fiscal year.

The agency initiated production of high Mooney, oil extended GR-S on March 11, 1951, at the Houston, Tex., copolymer plant operated by Goodyear. Production problems were ironed out quickly, and the rubber was distributed to manufacturers for evaluation as an oil masterbatch and as an oil-black masterbatch.

RFC said it is adding from 15 to 25% of a relatively cheap oil extender to the relatively high Mooney viscosity rubber produced at the copolymer plant. The resultant product is for some uses the equivalent of the same quantity of GR-S produced at normal Mooney viscosity.

The potential of this development is a lower-cost rubber and greater availability of GR-S without increasing use of styrene and butadiene.

"While the future requirements of this material are difficult to anticipate at this early date, it is believed that production of extended rubber will become a large factor in the synthetic rubber program," RFC declared.

Generally, it was reported, the trend is toward development of "tailor-made" types of GR-S suited to particular uses, such as the LTP GR-S mixed with the new furnace blacks to produce a superior tire tread. Improvements in polymer quality and compounding techniques are reducing the heat buildup drawback of GR-S in heavy-duty truck, bus, and airplane tires. At the year's end RFC had added three new GR-S types, raising the total of the commercial types to 33, and 60 new experimental GR-S types, bringing the total of these to 650. Some of the latter have met unique defense needs, including components for bazookas, it was said.

Three copolymer plants produced 30,686 long tons of GR-S latex during the year, and to meet increasing demand RFC was installing facilities at the years end to permit production of latex in five plants, much of it as LTP GR-S. Consumer acceptance of LTP GR-S latex required expanding productive capacity from 200 to 3,000 tons a month during the year, RFC said.

As for butyl rubber, superior to natural rubber in all-size inner tubes but the very largest heavy-duty types, RFC reported that during the year the "cold buckling" problem was solved by compounding developments to the point where "butyl tubes are now considered to have cold weather properties essentially equal to natural rubber tubes." The agency noted that butyl is well suited for making tire curing bags and other products.

During the year, research and development work was conducted for RFC by 11 universities, seven industrial companies, three independent research organizations, one government agency, the Government Laboratories operated by Akron University, and the Government Tire Test Fleet, operated by an industrial company. This entire group represents the addition of one independent research organization and the elimination of one university group since the previous year.

Of the total research expenditures, 28% went for fundamental research, 10% for applied research, and 62% for developmental work. Research continued to be aimed toward developing a better general-purpose rubber, particularly for heavy-duty carcass construction, to improving and developing specialty polymers, and toward increasing production of synthetics with minimum increase in costs and usage of critical materials. Activity of the Tire Test Fleet was stepped up with emphasis on developing polymers for heavy-duty truck tires, which the military regards as "highly essential."

Among the "noteworthy achievements" not previously listed were: preparation of several hundred experimental pilot-plant polymers for laboratory or end-product service evaluation; development of improved formulations for more rapid production of both regular and LTP GR-S; development of high conversion and high butadiene GR-S showing tread wear equal to that of LTP GR-S; copolymerization of vinyl toluene, a styrene subsitute, into satisfactory tire tread rubber; preparation of 93 articles for publication in scientific and technical papers. RFC spent $5,989,677 for research and development in fiscal 1951, 20% more than a year earlier, with most of the increase going into heavy-duty tire development work.

With reactivation the order of the day, the cost of maintaining and protecting standby plants was reduced from $1,794,621 in fiscal 1950 to $142,353 last year. Cost of reactivating standby plants was $20,500,000.

During the year RFC boosted the price of GR-S from 18.5¢ to 24.5¢ a pound and the cost of butyl from 18.5¢ to 20.75¢ a pound to maintain a "no-loss" financial position.

In another separate statement RFC reported actual December, 1951, production of 63,205 long tons of GR-S, including 27,202 tons of LTP GR-S and 1,986 tons of oil masterbatch GR-S. It reported butyl production of 7,900 tons. As of mid-January, the agency had scheduled January output at 60,000 tons for GR-S, including 27,400 tons of LTP and 2,670 tons of oil masterbatch. Figures on scheduled production generally turn out on the low side when records of actual production become available.

The agency said that the total for oil masterbatch rubbers should not be added to the total given for LTP GR-S since the base rubber used to produce oil masterbatch is taken from the overall LTP production.

The explosion of hydrocarbon gases, which caused a serious fire at the Plains butadiene plant on December 21, had only a negligible effect on the government's synthetic rubber operations, RFC said. An official reported that only a very small tonnage was lost, and this loss was readily made up for in other plants, without any effect on supplies for industrial consumers of rubber. Within minutes of the first reports of the fire, and while it was still raging, government apparatus was set in motion in Washington to speed equipment and parts to Borger, Tex., to replace any production equipment that was damaged.

RFC disclosed last month that a comprehensive survey gave support to its practice of charging ½¢ a pound to cover processing, depreciation, and other costs (excluding those of the chief materials) entailed in producing GR-S black masterbatch. These rubbers are priced according to a formula to cover the cost of the GR-S contained per pound, plus the cost of carbon black contained per pound, plus a charge of ½¢ a pound. The survey, covering several months' time, included all RFC masterbatch rubber production.

[1] Cold rubber.

Synthetic Rubber Export

The government sweetened the first-quarter export quota of GR-S late in January with 7,000 long tons, bringing the total quarterly allotment to 17,000 long tons.

The original quota, announced December 20, amounted to 10,000 long tons, of which 4,600 tons would consist of LTP GR-S and the remainder regular GR-S. The 7,000 tons added will be regular GR-S only.

The increase was made available in response to considerable pressure from foreign nationals who stood to get little, if any, synthetic rubber under the 10,000-ton quota. Even 17,000 tons, however, won't meet all overseas requests.

RFC found it could make the additional tonnage available without cutting back on domestic customers. Overseas factories, however, will probably have a harder job in getting their request met as RFC continues to convert from regular to LTP GR-S. Domestic users are expected to take all the LTP GR-S they can get.

The interagency group which plans the overall distribution of materials is scheduled to meet about February 15 to act on second-quarter synthetic rubber exports.

The Office of International Trade, United States Department of Commerce, completed the job of licensing the first-quarter quota before February. Deadline for filing applications for export licenses was January 7.

As of January 21, the agency had completed licensing for about a half dozen of the 40 or more countries among which it divided the first-quarter quota. While withholding specific data on country allotments, OIT said the largest single country quota was about 2,000 tons. This allotment was made before the additional 7,000 tons was made available by RFC. The historical pattern of rubber consumption in foreign countries figured importantly in determining how the quota was divided.

Officials considered first the applications to export to the smaller rubber consuming countries, since these were the easiest to screen. Left until last were some six or eight countries with the larger allotments, since these present a more formidable task of screening. Purpose of the screening is to weed out duplicate orders and avoid, to the extent possible, authorizing shipments for purposes other than current consumption by legitimate consumers, preferably in articles contributing to the defense of the free world.

There were no assurances that OIT intends to make public the quotas by countries established for the current quarter, evidently because with the demand for American synthetic rubbers so much greater than the amount available for export, it is fearful of arousing national jealousies.

GSA Rubber Plans

GSA was busy last month perfecting its plans to end the government's role as exclusive buyer of natural rubber.

Administrator Larson declared January 17 that he could not set a definite time, but he hoped to make a further announcement giving the precise date by April 1.

A report heard so often that it is beginning to assume the character of established fact is that GSA will permit resumption of private buying in April or May, with the limitation that no privately bought rubber can be consumed before July 1. GSA would not comment.

John B. Ingle returned from a four-month absence from Washington on January 14 to resume active direction of GSA's Rubber Division. Ingle was to remain in Washington for only two weeks, during which time he would take charge of developing the general plans for transferring natural rubber buying from government to industry.

Larson promised a further announcement on government withdrawal as exclusive buyer for industrial use in a statement announcing that GSA would reduce its selling price to industry to 50.5¢ a pound for February and March deliveries.

Timing of the reduction was opposed by the tire industry, which urged deferral of any price changes until April 1. The industry had informed Larson, when advised that a price reduction could be made, that any change midway in a calendar quarter would result in "administrative difficulties" for some rubber companies. These difficulties were not specified. There were hints, however, that the difficulties would be incurred in connection with certain contracts revised on a quarterly basis.

Written statements presenting the views of both GSA and the industry were sent January 15 to OPS, which approved the 1.5¢-a-pound reduction proposed by GSA.

Larson described the reduction as "another dividend to the rubber consumer brought about by the government's policy of passing along price reductions it has been able to effect by acting as sole American representative, for industry and stockpiling, in the market."

OPS, however, apparently can't move very far in translating the GSA's price reduction into "another dividend" to the public. It can't roll back ceilings below the February-March, 1951, level, at least under present law. It can peg ceilings at the December-January level of a year ago, which is what it has done for the tire manufacturing industry. It can apply the Capehart formula, which would reflect almost all cost changes incurred by manufacturers from a pre-Korea period to last July 26. Such action would probably mean higher, rather than lower ceilings. The last alternative is to establish price ceilings based on the prices of materials and labor at the time the new ceilings are made effective. Thus the ceilings would have to reflect, besides the $15 million or so savings made available to manufacturers by the 1.5¢ a pound natural rubber price reduction, the recent cost increases of about $75 million a year in wages and salaries resulting from the 13¢-an-hour wage boost put into effect by the industry earlier this winter and the higher bill for synthetic rubber—estimated at $26 million a year—resulting from the increase in government selling price for GR-S from 24.5 to 26¢ a pound.

Tire ceilings currently are frozen at levels prevailing during a six-week period when manufacturers were selling a passenger-car tire containing 51% natural rubber, more than today's tire contains. Taking today's M-2 specifications as a guide, the latest GSA price reduction works out to a saving of only a few cents per tire to the manufacturer. Considering this point, it seems likely that OPS would be content to leave tire manufacturing price ceilings where they are—at the January, 1951, level for replacement tires and somewhat below that ceiling for original equipment tires.

Natural Rubber in the Budget

The President's annual budget estimated the government's intake from natural rubber sales at $800 million in the 12-month period ending June 30, 1952, as compared with $774,125,000 the government will have laid out to buy the rubber. Operating expenses were reported at $19,986,835.

For the previous fiscal year, rubber sales brought in $105,016,206. The government spent $224,941,308 to purchase the rubber, putting $121,681,728 worth in inventory and reselling $103,259,580 worth. Operating expenses for that year were $1,216,928.

These figures came from the balance sheet presented for the Defense Materials Procurement Agency, set up several months ago to procure critical materials for the stockpile and industry. In effect the DMPA, headed by Jess Larson, absorbed the GSA, nominally the agency which buys and sells natural rubber.

No estimates were made for expenditures and sales in the coming fiscal year, since DMPA's authority is derived from the Defense Production Act, currently scheduled to expire June 30, 1952.

The President also asked Congress for $225,300 to conduct the guayule research program in this country in the year beginning July 1, the same amount of money being spent in the current 12-month period. The funds were asked for the Agricultural Research Administration of the Agricultural Department, which spent $209,691 on the program in fiscal 1951.

The purpose of the guayule program is to make the guayule plant more usable, to improve the quality of guayule rubber, and to develop methods for extracting and processing the rubber.

NPA on Rubber Machinery

The National Production Authority has agreed to look into charges by the rubber processing machinery industry that defense contractors in other industries are "pirating" its skilled labor with offers of higher wages than the rubber processing machinery firms are permitted to pay under current government wage ceiling regulations.

The Rubber Processing Machinery Industry Advisory Committee, which made the charges at a meeting with the NPA on January 16, said the pirating runs the gamut from machine operators to draftsmen and engineers. The committee said the industry is already experiencing labor shortages in Akron, O., and New Haven, Conn.

It reported that overall the rubber processing machinery industry's volume of defense contracts runs to about 10% of current orders and that the industry is meeting no particularly difficult materials problems.

Most of the firms, it said, anticipate that early government approval of a rubber facilities expansion program will bring a heavier load of orders from the rubber industry. The program is now being considered by the Defense Production Administration.

Brown Rubber Deputy Director

Harry D. Brown, of Gates Rubber Co., Denver, Colo., was named deputy director of the Rubber Division, NPA, on January 22. Formerly a consultant to the director of the Division, Brown succeeded E. A. Harris, of Rockville, Md., who joined the RFC to head up the Fiber Division.

Brown, assistant production manager at Gates, has been with the company since 1936 in various capacities including material requirements, production and production planning. During World War II

he served as a consultant to the Office of the Rubber Director in the War Production Board.

His appointment as deputy director on a loan and on a full-time consulting basis, NPA said, will initiate a rotating procedure in the NPA Rubber Division whereby the position of deputy director will be filled for six-month periods by qualified personnel from industry.

NPA on Crepe Sole Imports

A natural rubber crepe sole which has not been compounded, vulcanized, or attached to a shoe is still natural rubber and therefore cannot be privately imported, the NPA ruled January 23 in an interpretation of Order M-2.

M-2 bans private importation of natural rubber except as specifically authorized in writing by the General Services Administrator. Noting that crepe rubber is one type of tree-grown natural rubber, NPA said:

"The mere cutting of natural rubber crepe in the form and shape of a shoe sole does not substantially alter its character as to remove it from the category of natural rubber."

Price Actions

OPS last month paved the way for manufacturers of most rubber products, other than tires and tubes, to apply for ceiling price increases under the so-called Capehart formula.

Through issuance on January 18 of Amendment 4 to Supplementary Regulation 8 of CPR 22, the general manufacturers' ceiling price regulation, manufacturers who have established ceilings under SR 8 may apply OPS Supplementary Regulation 17 (in case of small manufacturers) or SR 18 (for large manufacturers). Both SR 17 and 18 of CPR 22 provide procedures for applying Capehart adjustments, that is adjusting pre-Korea prices to reflect subsequent increases in a broad range of costs up to July 26, 1951. Amendment 4 to SR 8 became effective January 23.

Use of SR 17 and 18 is optional. Also, the new amendment does not require a rubber goods manufacturer using either of these Capehart regulations for products subject to CPR 22 (but not to SR 8 of CPR 22) to also apply them to his SR 8 products.

SR 8 covers a wide range of rubber goods, but not all of them. Under SR 8, manufacturers of a large number of items determine their ceilings by applying industry-wide percentage cost adjustment factors to their base-period prices.

When the OPS issued its series of Capehart regulations in late December, it temporarily deferred their use for products covered by SR 8. Amendment 4 to SR 8 ends that deferral.

Under the new amendment a manufacturer who wants a Capehart adjustment for only some of the items he prices under SR 8 does not have to apply for such adjustments on all items he makes under SR 8. He can pick and choose, but with one limitation; he has to treat all items in the same industrial classification alike. SR 8 covers several classifications of rubber goods. Otherwise Amendment 4 releases those pricing under SR 8 from the general requirement of the OPS Capehart rules that a company wishing to apply for Capehart adjustments must apply for them on all its production, not part of it.

In recent weeks the OPS Rubber Branch has been making several studies relating to pricing in the tire and tube industry. The Branch is working on an extensive study of retail prices with a view to writing a regulation specifically covering sales of tires and tubes at retail. As with manufacturers' ceilings, the retail ceilings on tires and tubes are now established under the General Ceiling Price Regulation, which fixes each seller's ceilings at the highest price at which he sold the item during the December 19, 1950—January 25, 1951, period.

Another study, really an investigation, is nearing completion on the service of "painting" or otherwise applying a white sidewall to a tire which leaves the factory as a conventional black sidewall tire. OPS would like to issue a tailored regulation setting a uniform ceiling on such services, but the tentative findings of field investigators indicate that this might not be a simple matter. Evidently the methods being used to make a black tire look like a white sidewall vary considerably in both technique and cost of materials. Some dealers are vulcanizing strips of white pigmented rubber to the black sidewall. Others are using a variety of painting processes from baking in a white rubber paint to applying a few coats of ordinary house paint. While the evidence is not all in, it seems that many establishments performing this service have not bothered to confer with local OPS offices about appropriate ceiling prices. The service does come within the coverage of the agency's overall service regulation CPR 34. OPS has received many complaints from aggrieved consumers about the prices being charged for this service, and most of the complaints have been addressed to the Rubber Branch, which does not have jurisdiction.

As of now, OPS has no immediate plans to see that manufacturers of tires and tubes and other goods pass on the 1.5¢-a-pound reduction in the price of natural rubber which GSA put into effect February 1. It seems unlikely that OPS will try to force manufacturers to pass this on before the beginning of the second quarter, since the tire industry generally changes its prices on a quarterly basis. The July 1, 1951, reduction of 14¢ a pound was passed on in September on sales of original equipment tires to the automobile industry. In that instance tire manufacturers voluntarily cut their prices below ceiling.

Aside from what industry contracts may require, the OPS regulation covering manufacturers' sales to private-brand owners provides for ceiling price adjustments to reflect changing costs of manufacture; while the regulation covering tire mileage contracts requires escalator clauses under which the charges must reflect current cost of rayon or cotton and rubber.

The OPS announced on January 24 that application may be made for ceiling price adjustments by manufacturers of certain rubber products whose individual ceilings are abnormally low because their prices were out of line during the base period designated for their products by SR 8.

The OPS action, Amendment 5 to SR 8, effective January 24, prescribes the manner in which a manufacturer may apply for an adjustment. Application may be made if the manufacturer's ceiling on any product having uniform industry-wide specifications is lower than the ceilings of all competitive sellers of the indentical commodity and does not reflect the customary competitive price relation of the product with competitive products prior to June 24, 1950.

The Director of Price Stabilization may authorize an increase in a manufacturer's ceiling if it does not bring the ceiling price above (1) the price that would reflect the customary competitive price relation between the product and competitive products prior to June 24, 1950, and (2) the ceiling price of the lowest priced competitive seller of such commodity.

OPS pointed out that SR 8 is "more restrictive" than CPR 22 in that the latter allows manufacturers to choose any one of four calendar quarters as a base period, while SR 8 names a specific calendar quarter for each product. This particular quarter might have been an exceptionally poor one for some manufacturers who would have had no competitive pricing disadvantage had they been given the option of choosing a different three-month period on which to base the ceiling price adjustment factors spelled out in SR 8.

FTC Tire Discount Rule

January 4, FTC issued a quantity discount limit rule to govern sales of tires and tubes. The rule, effective April 7, fixes a carload quantity of 20,000 pounds ordered at one time for delivery as the maximum quantity which may be used to justify price differentials on automotive replacement tires and tubes.

This action was the first use by the Commission of the quantity limit power granted to it by Congress in 1936. Congress authorized the issuance of such limits where the Commission "finds that available purchasers in greater quantities are so few as to render differentials on account thereof unjustly discriminatory or promotive of monopoly in any line of commerce."

Four of the five commissioners issued a lengthy finding in which they reported much evidence that the tire industry's discounts were unjustly discriminatory. They found also that over some years very large discounts made available to heavy buyers had resulted in diminishing the ranks of independent tire dealers as well as the number of tire manufacturers.

Commissioner Lowell Mason alone dissented, attacking the judgment of his colleagues as "improvident and arbitrary." He said the Commission had exceeded the authority granted by Congress; and, Mason concluded, the rule is invalid. The chief proponents of the ruling, cheering the Commission's decision, conceded that they expect its validity to be challenged by tire manufacturers in the courts. Several major tire makers have indicated that they plan a court battle. At the least, litigation could put off the present effective date announced by the Commission.

The Commission found its evidence in figures turned up by its own staff and produced by the National Association of Independent Tire Dealers, Inc., at public hearings held in early 1950, several months after the Commission proposed the ruling.

The evidence showed that only 63 of some 52,000 tire establishments made large enough purchases in 1947 to qualify for maximum discounts offered by tire manufacturers. These discounts ranged from 26 to 30.5% for passenger-car tires and from 32 to 40% for truck tires and were available only to those purchasing at least $600,000 worth of tires a year. These 63 establishments accounted for about 30% of the replacement business. Two replacement tire sellers alone, accounting for 10.3% of the nation's market, were 5,150 times the size of any of their

47,000 smallest competitors whose annual volume each was under $100,000 and who, among them, held 52% of the market in 1947.

These 47,000, generally representing the independent dealers, were entitled to discounts ranging from 0 to 16% on passenger-car tires and from 0 to 20.5% on truck tires, the Commission said. The big buyers, with substantially larger discounts, it concluded, could profitably sell to the public at prices about equal to those the smallest dealers had to pay tire companies.

Under the ruling any replacement buyer ordering a 20,000-pound carload of tires must have as large a discount as available to the largest quantity buyer. Manufacturers may continue variations in differentials on purchases of less than 20,000 pounds. Apparently, the ruling will not affect differentials granted on the basis of services performed for the manufacturer by the buyer.

The actual effects of the Commission's ruling are matters for conjecture. Ideally, the ruling is intended to level the very biggest buyer (one buyer had an annual purchase volume of $50 million) to the same competitive position as any dealer able to lay out the money needed to buy a single carload, at least insofar as volume discounts from the manufacturer are involved.

The NAITD's executive secretary predicted that the ruling will mean a complete overhaul in tire practices as known today. It will help the smaller independent, he said, to meet the "rough competition of certain mail-order houses and private-brand accounts." While noting the opposition from Akron, the NAITD's Bill Marsh said the Commission's ruling should give the tire makers an opportunity of "getting out from some unprofitable tire contracts."

The prospect of lengthy litigation postponing the effect of the Commission's ruling seems so certain at this point that the OPS has taken no more than a cursory interest in the action. It has no plans, at the moment, to estimate the impact of the ruling on the tire pricing structure. Should the ruling take effect, however, OPS has a regulation, the General Overriding Regulation 18, under which to proceed.

This order permits manufacturers to reconcile the difficulties which, following a FTC order, might arise in connection with pricing under OPS ceiling price regulations. The GOR is designed for the use of sellers who find that they will violate an FTC order if they abide by OPS orders. In such situations the seller can petition OPS for relief and work out an arrangement where he lowers the prices for his high priced accounts and raises those for his low priced accounts, with the end effect that the seller enjoys the same net return provided by OPS ceiling price regulations.

If OPS is still around when and if the tire discount limit becomes effective, it is hard to see how the present ruling will result in a smaller tire bill to the public under the type of bargaining arrangement sanctioned by GOR 18.

It should be noted that the leading advocate of the discount limit ruling, the NAITD, while greeting it as a boon to the small tire dealer, said that it "possibly" might result in lower tire prices to the public.

Asbestos Allocation

NPA last month placed spinning grades of chrysotile asbestos fiber under allocation to assure that decreasing supplies of this primarily imported material are made available to manufacturers of end-products most essential to the defense effort. The material is used in large quantity in textiles, molded plastics, safety clothing, cable insulation, electrical tape, friction materials, packing, and gaskets.

The action was announced January 17 through issuance of Order M-96, effective February 1. Beginning on that date, the use of some grades of spinning fiber is prohibited for all but certain specified end-uses. Limitations are placed also on using the material for producing certain other end-use products.

Receipt of deliveries or use of all spinning grades of asbestos is restricted to processing it into carded fiber, sliver, rovings, lapps, yarns, tapes or cloths.

A base period the three years running from January 1, 1948, to December 31, 1950, was established, and monthly usage is restricted to 50% of average monthly consumption in that period for the following end-items: theater safety curtains, gun covers, ironing board covers, passenger-car woven brake linings less than ¼-inch thick by two inches wide (except for automatic transmission); for oil burner wicking (except for military orders, which are exempted), and here permitted monthly usage is 70% of the base-period rate.

No one is permitted to put into process or use in any month Canadian grade 3Z chrysotile asbestos fiber to produce 85% magnesia or other high-temperature insulations, in excess of his average monthly consumption of that grade for that purpose during 1950. None of these prohibitions and limitation on using spinning grades of asbestos fiber applies to Canadian grade 3Z used in producing compressed sheet packing or electrolytic paper. They do not apply either to asbestos waste or scrap that cannot be reprocessed and used in operations permitted by M-96. Exempt from the order are persons using less than 100 pounds a month of spinning fiber.

—A.J.K.

CALENDAR

Feb. 20.	Washington Rubber Group. New York Section, SPE. Hotel Gotham, New York, N. Y.
Feb. 21-22.	The Society of the Plastics Industry (Canada) Ltd. Tenth Annual Conference. Royal York Hotel, Toronto, Ont., Canada.
Feb. 25-27.	Committee D-20 on Plastics, ASTM. Benjamin Franklin Hotel, Philadelphia, Pa.
Feb. 27-29.	Committee D-9 on Electrical Insulating Materials, ASTM. Benjamin Franklin Hotel, Philadelphia, Pa.
Mar. 1-31.	The 1952 Red Cross Fund Campaign.
Mar. 3-7.	American Society for Testing Materials. Spring Meeting and Committee Week. Statler Hotel, Cleveland, O.
Mar. 4.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Mar. 6.	Northern California Rubber Group.
Mar. 11-14.	The Society of the Plastics Industry, Inc. Fifth National Plastics Exposition. Convention Hall, Philadelphia, Pa.
Mar. 12.	Newark Section, SPE. Military Park Hotel, Newark, N. J.
Mar. 17-19.	National Association of Waste Material Dealers, Inc. Thirty-Ninth Annual Convention. Waldorf-Astoria Hotel, New York, N. Y.
Mar. 19.	New York Section, SPE. Hotel Gotham, New York, N. Y. Washington Rubber Group.
Mar. 20.	Commercial Chemical Development Assn. Annual Meeting. Statler Hotel, New York, N. Y.
Mar. 21.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Mar. 22-Apr. 6.	Chicago International Trade Fair. Navy Pier, Chicago, Ill.
Mar. 23-27.	American Chemical Society. National Meeting. Buffalo, N. Y.
Mar. 27.	Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.
Apr. 1.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Apr. 1-4.	American Management Assn. National Packaging Exposition and Conference on Packaging, Packing, and Shipping. Auditorium, Atlantic City, N. J.
Apr. 3.	Northern California Rubber Group.
Apr. 4.	Akron Rubber Group.
Apr. 9.	Newark Section, SPE. Military Park Hotel, Newark, N. J.
Apr. 9-11.	SPI Reinforced Plastics Division. Seventh Annual Technical Session. Edgewater Beach Hotel, Chicago, Ill.
Apr. 10.	Elastomer & Plastics Group, Northeastern Section, A. C. S.
Apr. 16.	Washington Rubber Group. New York Section, SPE. Hotel Gotham, New York, N. Y.
Apr. 17.	Rhode Island Rubber Club. Metacomet Golf Club, East Providence, R. I.
Apr. 22.	Association of Consulting Chemists & Chemical Engineers, General Symposium. Belmont Plaza Hotel, New York, N. Y.
Apr. 30-May 1-2.	Division of Rubber Chemistry, A. C. S. Cincinnati, O.

Other Industry News

Litchfield's "Living" Stockpile

As mentioned briefly on page 500 of our January issue, Litchfield of Goodyear, in his "Notes on America's Rubber Industry," in an issue made public in late December, proposed that the United States Government invest $100 million in 300,000 acres of natural rubber planting in the Western Hemisphere to provide for a "living" stockpile of rubber for national security.

Litchfield cited the work during the last 15 years of a small group of Goodyear technicians, working closely with experts from the U. S. Department of Agriculture at the Goodyear plantations in Costa Rica, as proof that natural rubber plantations could be successful in the Western Hemisphere and could produce at sufficiently low cost to complete with the plantations of the Far East.

The proposed 300,000 acres of new plantings would yield 150,000 tons of natural rubber annually, an amount sufficient to take care of those needs for which no synthetic rubber has as yet been found to be a complete replacement.

As against the $100 million figure spread over a six- or seven-year period, the annual cost of maintaining a five-year stockpile of natural rubber in this country at an average cost of 45¢ a pound is approximately $28 million, which includes $19 million in annual interest on our

cash outlay and about $9 million annually for freight, warehousing, and distribution involved in rotation of stocks. This expense, whether it remains at this level or levels off owing to a reduction in the price of natural rubber, goes on and on whereas the cost of establishing new plantations would cease after six or seven years, it was explained.

In connection with this country's course in the matter of rubber policy, Litchfield said it has been erratic and short sighted.

When a rubber crisis develops, we spend lavishly and improvise wildly.

When the crisis has eased, we pull back into our comfortable shell and do nothing. And we seem able to adduce countless reasons to justify our action, he added.

The time has come when we should mend our ways. It will take time, money, and intelligent effort. But now we *know* we can make the effort pay off in terms of heightened security and permanent economic gain. The Goodyear Costa Rican experiment has provided a sound foundation for action.

We should be getting our hemispheric program under way without further delay, Litchfield concluded.

Collyer on Rubber Cartels

No justification exists for participation by the United States Government in any form of fixed price, or cartel agreements in rubber, Collyer of Goodrich declared in a letter addressed to Charles E. Wilson, Defense Mobilization Director, in January.

Collyer, concerned over continuing reports, some in connection with Prime Minister Churchill's visit, that the government may again be under pressure to enter into rubber agreements, said that "such arrangements would perpetuate grossly inflated prices for crude natural rubber, adding unnecessarily to the already high tax burden now borne by American citizens."

In his letter the Goodrich president said, "Our rubber position is now greatly improved. We now have 850,000 long tons, or more, of natural rubber in this country and have purchased for early 1952 delivery enough more so that the government can soon cancel the prohibition against private imports.

"Our domestic production of American rubbers has now increased to an annual rate of approximately 930,000 tons so that the export of substantial quantities of general-purpose (GR-S) rubber to friendly nations has been authorized by government. So far as rubber supplies are concerned, the nation is prepared for war and, equally important, for peace.

"Before Korea, the total cost of natural rubber produced by efficient growers was about 10¢ a pound delivered in the United States, and the average cost of all producers was probably not more than 16¢ a pound. Although the costs of some producers have undoubtedly increased since then, it is reasonably certain that a 20¢ a pound price would now yield substantial profits to a great majority of producers.

"In January, 1950, the selling price of natural rubber was 18¢ a pound delivered in New York, and following Korea the price advanced to 90¢ a pound in November, 1950.

"At the time private purchasing of natural rubber was prohibited in December, 1950, the price had declined to 70¢ a pound, and the world price has since fluctuated between a high of slightly more than 85¢ down to the present price of 49¢ a pound.

"The present price of natural rubber is more than 170% higher than in January, 1950; while during the same period cotton prices have advanced only 37%, and tin prices about 50%.

"There is now every reason to believe that natural rubber prices will decline to a reasonable level after government stops buying large quantities of rubber for the strategic stockpile.

"In view of our present rubber supply position, the cost of producing natural rubber, the present high market price for natural rubber, and the probability of a substantial decline in natural rubber prices in the near future, there is no justification, in our opinion, for participation by the United States in any form of fixed price, or cartel agreements in rubber.

"It is our belief that economic aid to any foreign country, or area, should be authorized by Congressional appropriations and should not be extended through paying exorbitant prices for materials," Collyer concluded.

RMA Rubber Use Figures

New rubber consumption during 1951 amounted to 1,214,959 long tons, 3.5% lower than the 1,258,557 long tons consumed during 1950, The Rubber Manufacturers Association, Inc., reported in late January.

With government restrictions continuing during 1951, natural rubber consumed totaled 454,271 long tons, a decline of 36.9% from the 720,268 long tons consumed during 1950. Consumption of synthetic rubbers increased 41.3% to 760,688 long tons from the 538,289 long tons used during the previous period. Consumption of reclaimed rubber during the year was estimated at 347,042 long tons, 14.3% above the previous year's usage of 303,733 long tons.

Plastics Materials Situation

The plastics raw material supply situation has improved substantially from that of a year ago, according to W. T. Cruse, executive vice president of The Society of the Plastics Industry, Inc. While one or two of the scores of different types of plastics are still a bit tight, in main, plastics raw materials are generally available.

The year 1952 will see more new plants completed for the production of plastics raw materials. These plants and those completed in 1951 are an indication of the decentralization of manufacturing now taking place in the plastics industry. New plants have appeared on the West Coast and in several southern states.

The United States today, has about 5,000 plastics companies. These concerns, which will produce more than a billion dollars worth of plastics products in 1952, produce these products by molding, extruding, laminating, reinforcing, calendering, casting, etc.

This year's production of synthetic resins from which all plastics products are made, it is estimated, will be up approximately 10% to 2,600,000,000 pounds, as compared with an estimated 2,365,000,000 pounds for 1951 and an actual production of 2,150,518,000 pounds in 1950.

The plastic raw material supply situation at the beginning of 1952 was summarized as follows:

Phenolics—Supply about normal.
Ureas—Supply normal.
Melamine—Supply adequate, but future potential military demand may affect this supply later this year.
Cellulose Acetate—Normal supply.
Cellulose Acetate Butyrate—Normal supply as production was recently increased.
Ethyl Cellulose—Normal supply, but future military requirements may alter this situation.
Acrylics—Normal supply.
Polystyrene—Normal supply, just the opposite from last year at this time when supplies were extremely short.
Vinyls—Normal supply.
Nylon (plastic type)—Normal supply for reasonable civilian uses.
Polyethylene—Still in short supply, but increasing production is relieving this situation to some extent.
Polyesters—Normal supply, but coming military programs may alter this situation.

Born in 1868, the plastics industry has finally become of age, Mr. Cruse said. Barring a world conflagration, 1952 will see further expansion of production facilities, continued increase in the consumption of plastic raw materials, and a persistent growth in the demand for products made of plastics or with plastics as component parts.

Somewhat similar comments were made by George C. Miller and C. W. Blount, executives of Bakelite Co., a division of Union Carbide & Carbon Corp.

Mr. Miller estimates the industry's production of polyvinyl chloride-type materials will probably be at a 1952 rate of from 400,000,000 to 425,000,000 pounds, somewhat higher than the 1951 output. Polyethylene in 1952 will be produced at a top capacity of 75,000,000 to 80,000,000 pounds, as compared with 65,000,000 in 1951.

The continuing shortage of polethylene is not so much a matter of raw material availability, but rather is limited by plant capacity. Mr. Miller said that the raw material outlook for vinyls appears reasonably good, and these materials are expected to be in sufficiently good supply to meet any normal demand for a good portion of the coming year.

According to Mr. Blount, there will be a larger overall supply of phenolic and polystyrene materials in 1952 for two reasons: (a) increased capacity through ingenuity in ironing out bottlenecks; (b) reduced production of civilian items such as television, radio, automotive and electrical appliances, principally home refrigeration.

Commenting on the frequently expressed thought of plastics being used as a replacement or alternate material for steel, Mr. Blount expressed the opinion that plastics could *not* be used in sufficient quantity to be impressive. This opinion is based on views of the engineering properties and supply.

Important new developments and applications in plastics include: a new plasticized calendered film, rapidly gaining popularity for pressure-sensitive tape backing; the use of vinyl plasticized cast film for military moisture vapor packaging; improved topographical maps for military use made from Vinylite rigid sheet; new toys made of an extruded sheet of Vinylite resin compound; Bakelite black polyethylene compound used as a dielectric for Army field wire, as well as a 12-channel carrier cable; polyetheylene replacing gutta percha for deep-sea telephone cable.

Styrene-rubber materials are now used for pipe on farms and in mines. Lightness in weight and corrosion resistance are the chief advantages. Most outstanding new uses for phenolic materials are for packaging foam, impregnated wood for jigs and fixtures, and increased production use on foundry molds.

Labor News

Hope for settlement of the strike which began at the Willoughby plant of Ohio Rubber in October faded when the offer of a 13¢-an-hour wage increase and changes

in holiday pay and other items by the company was rejected by the United Rubber Workers, CIO, union at the plant. The union still termed the company's offer unsatisfactory.

A plant at Conneautville, Pa., was also on strike, and at the beginning of the year employes at the West Coast plant of the company joined the other employes of Ohio Rubber in strike action.

Talks were resumed in Willoughby in early January between the company and the union with the help of the Federal Mediation and Conciliation Service. The major difficulty seems to be connected with a number of issues governing working conditions, including the question of a union shop, rather than wages.

Although no agreement had been reached in mid-January, about 400 of the 800 workers at the Willoughby plant had returned to work.

A series of work stoppages plagued the Akron plants of the Firestone Tire & Rubber Co. during December and January. One difficulty involved garage workers, and another, workers involved in the production of tank cannon and aircraft rockets.

EAST

Goodrich News

Clinton B. McKeown has been named technical superintendent of the aeronautical products division of The B. F. Goodrich Co., Akron, O. He has been with the company 15 years. After service in the chemical laboratories, McKeown held a number of technical posts in the processing and tire divisions until 1942, when he joined the technical staff of B. F. Goodrich Chemical Co., where he handled varied technical assignments. He has been manager of the raw materials inspection and development department in Akron since 1950.

A revolutionary new belt conveyer system, developed jointly by Goodrich and Chain Belt Co., is overcoming the operating hazards found in the sub-zero winter weather normal to Minnesota and Michigan iron ranges. Until now, belt systems conveying iron ore from mines to carriers shut down for four months during the winter. The new system keeps the ore moving in a steady stream from mines to surface stockpiles despite temperatures as low as —40° F. The new conveyer system features a "turnover" arrangement whereby the belt turns itself over after delivering its load. The clean side of the belt always runs on top of the return idlers, and there is no clogging or damaging build-up of tacky material on idlers or pulleys. The belt turns over again before accepting a new load. The "turnover" action is accomplished by positioning two twist pulleys at each end of the system, and any conventional belt system can be converted into the "turnover" type.

Nicholas J. Jammal, who has been with Hershberg Products Co., Inc., Ashtabula, O., since June, 1951, recently was elected its president and general manager. He previously had been works manager of Vulcanized Rubber & Plastics Co.

MSA French Rubber Industry Productivity Team: (1) Jacques Baratte, Group Leader, General Manager, Ets. Pincet & Baratte, Puteaux, (Seine); (2) Robert P. Apine, Chief, Time-Study and Job Analysis Division, Kleber-Colombes, Colombes, (Seine); (3) Rene E. Augereau, Assistant Technical Manager, Caoutchouc S.I.T., Clichy, (Seine); (4) Georges Boyer, Chief, Engineering and Research Department, Soc. Auto-Cable, Boulogne, (Seine); (5) Lucien Carnoy, General Foreman, Ets. Hutchinson, Langlee, (Seine & Oise); (6) Marcel Delamar, Skilled Worker, Soc. Palladium, Argenteuil, (Seine & Oise); (7) Jean Duttlinger, Technical Manager, Soc. Wolber, Soissons, (Aisne); (8) Andre Ernest Guelle, Foreman, Hutchinson; (9) Andre Lazou, Production Engineer, Kleber-Colombes; (10) Rene Pierre Millot, Assistant Manager of Planning and Statistics, Soc Dunlop, Paris, (Seine); (11) Robert Louis Planelle, Foreman, Kleber-Colombes; (12) Michel Rideau, Assistant Technical Manager, Hutchinson; (13) Henri J. Saint-Maurice, Administrative and Personnel Manager, Dunlop, Montlucon, (Allier); (14) Mario Siccardi, Skilled Worker, Kleber-Colombes

MSA French Rubber Industry Productivity Team

Under the sponsorship of the Mutual Security Agency (formerly the Economic Cooperation Administration), a French Rubber Industry Productivity Team composed of 14 representatives of the French rubber industry spent the period from January 10 to February 10 in the United States participating in meetings conducted by leaders in the educational field, government, and industry in order to observe and study the methods, equipment, and operations employed in the U. S. rubber industry. The French team included three individuals who represented management, six technicians, and five workers. The accompanying photograph provides not only a picture of these men, but their names, titles, and company affiliations.

The team, conducted on their tour by James V. Foley, of the MSA, as project manager, arrived in New York on January 10. The itinerary of their conferences and tour was as follows:

1. In New York they had a labor orientation meeting with Lew Johnson, international representative of the American Federation of Labor, and an industry orientation meeting with Ross Ormsby and W. James Sears, vice presidents of The Rubber Manufacturers Association, Inc., and with R. G. Seaman and M. E. Lerner, editors of the India RUBBER WORLD and *Rubber Age*, respectively. A visit to the nearby mechanical goods plant of the United States Rubber Co., in Passaic, N. J., was also arranged.

2. The Team then traveled to West Haven, Conn., to the plant of Armstrong Rubber Co., where Frederick Machlin, executive vice president of that company, acted as their host.

3. Journeying to Boston, Mass., the team visited the plant of Hood Rubber Co., Watertown, Mass., being received by Dexter C. Whittinghill, plant manager. While in the Boston area, a visit was also made to the Converse Rubber Co., Malden, Mass., and the Team met with Albert H. Wechsler, vice president and general manager.

4. The period from January 25 to February 8 was spent in Akron, O. Visits were arranged to the Firestone Tire & Rubber Co., where the Team met with Harvey J. Firestone, Jr., chairman of the board, L. R. Jackson, president, James E. Trainer, vice president in charge of production, and F. F. Censky; The B. F. Goodrich Co. and John L. Collyer, president, W. C. Gulick, president of the International B. F. Goodrich Co., and H. E. Heilman; Akron Standard Mold Co. and W. P. Voth, president; Adamson United Co. and F. L. Dawes, president; General Tire & Rubber Co. and William T. O'Neil, president, and C. F. Burke, assistant to the president. Also while in Akron, the Team met with L. S. Buckmaster, president, United Rubber Workers of American, CIO, and H. A. Bradley, president, Chemical Workers Union, American Federation of Labor.

5. From February 9 through February 13, the Team met with officials of the U. S. Department of Labor and the MSA in Washington, and also with the American Council of Education and the National Planning Association.

The Team was scheduled to return to New York on February 14 and depart for France on February 16.

Upon its return to France, the Team will prepare a report of its impressions and observations. This report will be disseminated to all segments of the French rubber industry, together with any recommendations that might contribute to increased productivity.

G-E Silicone Department

The formation of a new General Electric Co. chemical division department, to be known as the silicone products department, has been announced by Robert L. Gibson, division general manager. The new department will have headquarters at Waterford, N. Y., and will have as its general manager Charles E. Reed, previously engineering manager of the chemical division. With the formation of the new department, the division is now made up of four product departments; the other three are plastics, chemical materials, and laminated and insulating products. Silicones were formerly included as products made by the chemical materials department, and formation of the new silicone department was made desirable by rapidly expanding business.

Personnel Promoted

An expansion program to increase greatly the production capacity of the G-E silicone plant at Waterford was also announced by Mr. Gibson. Located on a 65-acre site, this plant is now producing silicone fluids, greases, rubbers, resins, and water repellents. Contracts for the new building program, costing in excess of $5,000,000, have already been awarded. Additional manufacturing facilities are now being installed, and the new facilities are expected to be in operation by the end of this year. The laboratory staff will be doubled, and plant employment is expected to increase by 50%. The long-range view for future growth of the plant is optimistic, according to Mr. Gibson. Research and development projects now in progress indicate that silicones may soon enter new fields of application.

Several appointments in the chemical division also were announced last month.

John L. McMurphy has been appointed general manager of the plastics department; Sam L. Brous, general manager of the chemical materials department; James W. Raynolds, marketing manager of the chemical division; and Alphonse Pechukas, engineering manager of the division.

Mr. McMurphy succeeds Herbert M. Brusman, resigned. Mr. McMurphy started with G-E in 1930 on the training course for chemists and chemical engineers. He served in Pittsfield, Schenectady, and Philadelphia Works laboratories before joining the plastics department in 1933. He was placed in charge of the resin and compound plants in 1937, in 1942 was named manager of phenol and compound manufacturing at Pittsfield, and was appointed manager of the chemical materials department in 1948.

Mr. Brous came with General Electric in 1949 from B. F. Goodrich Chemical Co., where he had been manager of the chemical sales department. Prior to his recent appointment Mr. Brous was marketing manager for the chemical division.

Mr. Raynolds, who succeeds Mr. Brous as marketing manager, began with G-E in 1949 as sales manager of silicone products. The same year he was made assistant department manager on silicones. Mr. Raynolds served with the War Production Board during World War II as assistant director of the chemical bureau. In 1944 he had joined Sun Chemical Co. as vice president, and his experience with chemical and allied products includes sales and research positions with Binney & Smith Co. and Devoe & Raynolds Co.

Dr. Pechukas has been engineering manager of the chemical materials department since 1950. He formerly had been director of research for the Columbia Chemical Division, Pittsburgh Plate Glass Co.

William S. Smith has been named advertising manager of the division, responsible for advertising and sales promotion activities on all division products, including molded plastics, silicones, plastics molding compounds, protective coatings, and laminated and insulating products. Mr. Smith came to the company in 1939 as an editor in the publicity department at Schenectady, N. Y. In 1942 he entered the service and returned to Schenectady in 1946 as a supervising editor in the advertising and sales promotion department. In 1947 he was appointed account supervisor in the industrial advertising section.

Improved Silverware Container

The silverware container for G-E's automatic dishwasher is now being molded from G-E 12487 black rubber-phenolic compound to eliminate scratching of silverware and to effect economies. Costs ran high on the brass screen containers formerly used because of bending in shipment and assembly, and customer complaints indicated that the metal containers were scratching silverware. The high shock resistance of the rubber-phenolic compound gives ample protection against breakage and is accounted for by the nitrile rubber constituent. Holes are molded into the base of the new container to provide for proper drainage.

Du Pont Economy Survey

Economic surveys of less than one-third of the 71 plants of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., showed these manufacturing operations put at least $245,00,000 into circulation in their six states through purchases and payrolls during 1950. The study covered certain purchases of materials and services by 23 plants, employing about 40,000 men and women, in New Jersey, Kentucky, West Virginia, Virginia, Tennessee, and South Carolina. The study excluded extensive construction buying and payrolls, purchases by the plant from companies outside their home or adjacent states, and buying by other company plants in the states surveyed. The money-in-circulation figure consisted of $94,000,000 in purchases, and $151,000,000 in total payrolls. Du Pont operates 71 plants in 25 states and 38 research and development laboratories in nine states. For these and various administrative and sales offices, the company paid or set aside in 1950 totals of $466,000,000 for materials, services, and miscellaneous items, and $323,000,000 for wages, salaries, and employe benefits.

Changes in Sales Staffs

Roy E. Troutman has been appointed sales manager for white pigments in the du Pont pigments department, moving up from his post of assistant sales manager and succeeding William R. Morpeth, who is continuing in an advisory capacity pending his retirement later in the year.

At the same time three other changes in pigments sales were made. Donald C. Booth, manager of the southwestern sales office at Houston, Tex., was appointed assistant manager of the southeastern sales office, Philadelphia, Pa. H. C. Ballard, a salesman in the Houston office, succeeds Mr. Booth; while John W. Croft, a chemist in sales service at the Newark, N. J., pigments plant, is now a salesman in the southwestern area, with headquarters in New Orleans, La.

Mr. Troutman has been engaged in chemical research and the sale of pigments and related products since 1925. He joined du Pont in 1936 as a chemist at the Newport, Del., pigments plant, became a research division head there in 1939 and a technical representative, sales promotion, in the Wilmington office, in 1940. From 1942 to 1944 he worked closely with defense products specification agencies. He became manager of the Houston office in 1945, and of the San Francisco office in 1947 and was named manager of West Coast sales in 1948 and assistant manager of white pigments sales in 1950.

Mr. Morpeth joined the company in 1917 as a pigments salesman in the New York, N. Y., office and became sales manager of that office in 1920, eastern district sales manager in 1925, assistant general sales manager for the pigments department at Wilmington in 1925, and sales manager for white pigments in 1944.

Mr. Booth has been in research and sales work on pigments for du Pont since 1928, when he joined the company as a chemist at the Newark plant. He became a technical representative for white pigments in 1935, moved to the Philadelphia office as a salesman in 1937, and was named manager of the Houston organization in 1947.

Mr. Ballard, who started with the company in 1936, was engaged in research work on white pigments at the Newport and Edge Moor, Del., plants until 1941, when he left for military service. He returned in 1946 as a production foreman at Edge Moor and went into research work again the following year at the Newark plant. In 1948 he went into sales service work and later that year became a salesman in the Houston organization.

Mr. Croft began with the company in 1947 as a production foreman at the Edge Moor pigments plant and later that year became a reserch chemist at the Newport plant. He went into sales service work there in 1948 and last year moved to the Newark plant, continuing as a chemist in sales service.

Enlarged Research Center

Koppers Co., Inc., Pittsburgh 19, Pa., through President Brehon Somervell, has announced that it will embark on an enlarged and more unified program of research, with the major portion of this work to be centered at Verona, Pa., where new laboratories are now nearing completion. The company has purchased a plant site it formerly leased at Verona, rearranged its buildings, and added a new building to house administrative offices, a research library, and conference rooms.

According to G. F. D'Alelio, vice president and manager of Koppers' research department, the new Verona center will not only provide enlarged and improved laboratory facilities, but is designed to allow extensive pilot-plant work. One large area will be devoted to pilot-plant work in chemicals; another in fuels; and a third in testing and improving the electronic precipitators and other large machinery made by Koppers. Dr. D'Alelio and his administrative staff will continue to have their offices in Pittsburgh. The administrative offices of the research department will be moved to the Koppers Bldg. early in 1952 from their present location in the Oliver Bldg.

Reardon Retires

Herbert H. Reardon retired as executive vice president and director of Columbian Carbon Co., 41 E. 42nd St., New York 17, N. Y., and officer of several of its subsidiaries with the close of 1951. Mr. Reardon for 25 years directed all Columbian's carbon black production as well as its oil and gas and gasoline operations in the Southwest. He was connected with Columbian operations for 35 years, having pioneered in oil, gas, and carbon black production in several areas of Louisiana, Texas, and New Mexico.

Wesley C. Ekholm has been named general manager of Columbian Carbon's carbon black operations, to succeed Mr. Reardon. The former will be in charge of the company's six furnace black plants and six channel black plants whose annual output is about four hundred million pounds. Mr. Ekholm since August 1, 1949, had been superintendent of carbon black production under Mr. Reardon at Monroe, La., and prior to that had held a top position in the research and development department of the company. Mr. Ekholm came to Columbian Carbon on June 15, 1936, after graduation from Rice Institute, as a chemical engineer.

Mr. Reardon's service with the company began in 1917 when he became affiliated in Charleston, W. Va. He went to Monroe, La., in February, 1919, as superintendent of Southern Carbon Co., and directed all of that company's operations in that area. At that time Southern Carbon was the only subsidiary of Columbian Carbon operating in Louisiana. Under Mr. Reardon's direction Southern Carbon Co. became a major factor in the gas industry and one of the largest producers of carbon black in the United States.

Norris Advanced

Standard Products Co., Cleveland 2, O., through President Harry D. Myers, has announced the promotion of E. A. Norris from plant manager to division manager of its Port Clinton Division. Among Norris's duties will be completion of the conversion of the division into a modern and efficient rubber plant and supervision of production of tank tracks to meet orders totaling $6,000,000. A program to improve the mechanical rubber facilities is already well under way. To provide space for the tank track work and other mechanical rubber operations, window channel production activities are being transferred to other company plants, which are located at Lexington, Ky., Gaylord, Mich., and Long Beach, Calif.

In his new position, Norris succeeds L. S. Larson, who has been transferred to the firm's offices in Cleveland in an administrative capacity under the vice president in charge of finance. Norris, one time factory manager for Acushnet Process Co. and Sun Rubber Co., joined Standard Products in 1948.

Fidelity Machine Co., Inc., 3908-18 Frankford Ave., Philadelphia 24, Pa., has appointed Robert Scholes vice president in charge of engineering, and Roy D. Faigenbaum vice president in charge of manufacturing. Both men have been with the company 13 years, Mr. Scholes most recently as works manager, and Mr. Faigenbaum as plant superintendent.

Holds Dealer Sessions

New York Belting & Packing Co., Passaic, N. J., has initiated a new type of general meeting for its distributers—a round-table session where the distributers do the talking and the manufacturer does the listening. The first was held November 27 in Chicago. Thirteen distributers covering the central states elected their own chairman and selected their own topics for discussion. B. F. Reuther, vice president of the rubber company, started the meeting with a few brief remarks. From then on it was a distributer show. The meeting was so successful that more are planned for other sections of the country during 1952.

Names Sales Representatives

Appointment of two new district sales managers and three new factory representatives was announced January 14 by Wenzel A. Lindfors, sales manager for New York Belting.

Carl G. Link, Jr., Chicago factory representative, was named northern district sales manager covering Iowa, Indiana, Illinois, northwestern Pennsylvania, northern Ohio, southern Wisconsin, and northern New York. He will make his headquarters in Chicago.

William I. Butler, factory representative in Memphis, Tenn., was named southeastern district sales manager covering all of the southeastern section of the country from the Mississippi to the Atlantic Coast. He will be stationed in Memphis.

Frank E. Cavanaugh has been added to Mr. Link's staff as a factory representative in the northeastern district, with headquarters in Chicago.

Joseph Van Schaik, with the home office in Passaic, has been named factory representative in the Rocky Mountain states, with headquarters in Denver, Colo.

Wayne E. Law, in the Houston office, has been made oil field factory representative in the Rocky Mountain states, also with headquarters in Denver.

Loan Arranged

Bradley Dewey, president of Dewey & Almy Chemical Co., Cambridge, Mass., announced January 18 that the company had arranged to borrow $2,000,000 from W. R. Grace & Co., New York, N. Y., for five years. This loan will bear interest at 3½% and may be converted into Dewey & Almy common stock at any time after two years at the option of either Grace & Co. or Dewey & Almy.

The basis of the stock for conversion would be determined in accordance with a formula, it was announced, and would be approximately $25 a share less 15¢ for each elapsed quarter from February 1, 1952, to the date of conversion. If the conversion option is exercised, Grace & Co. would own less than 10% of the outstanding stock, Mr. Dewey added.

This loan, together with additional borrowing currently being discussed with insurance companies, will provide for further plant expanson and working capital, he pointed out.

Mr. Dewey, in a letter to stockholders announcing the loan, said that the directors of the company were very glad to have this relation between Dewey & Almy and W. R. Grace & Co. The many interests which the latter has in this country and in South America should be helpful to Dewey & Almy, he explained.

Baker Appointments

Baker Castor Oil Co., New York, N. Y., has elected as directors J. A. Johansen, vice president, and Daniel R. Finn, treasurer.

Baker also has appointed James F. O'Brien sales representative covering all counties of New York State except Kings, Queens, Nassau, Suffolk, Chautauqua, Erie, and Niagara. Mr. O'Brien, with the company since 1945, has been successively chemist-in-charge of the Bayonne plant, member of the technical service department, and chief of the quality control department. He also has acted as Baker's representative on ASTM Committee D1 from 1946 to 1952. Before joining Baker he was control chemist and later a research and development chemist with Best Foods, Inc. Mr. O'Brien received his B.S. degree in chemistry from St. Peter's College, where he was an instructor while earning his M.S. degree. He is a member of the American Chemical Society, American Oil Chemists' Society, and the Northeast Oil Chemists' Society.

Seiberling News

Seiberling Rubber Co., Akron 9, O., has announced that a cut-resistant natural rubber tread stock is now available to its recapping customers. According to E. F. Gates, manager of the company's accessories and repair materials department, the hard tread stock will be made only in natural rubber, in which cuts or tears do not tend to enlarge or extend as they do in synthetic rubber. The stock is particularly suitable for retreading tires used in off-the-road service where cutting is a major problem, as in mining, logging, and construction work. Seiberling uses this stock in its Traction Lug hard tread truck tires.

Two promotions in the Seiberling personnel department were announced last month by Wilfred Andrew, factory personnel administrator.

Lester G. McCurdy, factory employment manager, was named industrial relations manager, and Paul V. Rosenberger replaced him as employment manager.

McCurdy joined the time study staff in 1946 and became employment manager in 1950. Rosenberger also started in the time study department in 1950.

McCurdy served in the Navy Air Force during World War II and worked a short time at Goodyear Tire & Rubber Co. after he was discharged.

Rosenberger served with the Eighth Air Force during World War II and was a time and methods engineer at American Hard Rubber Co. before joining Seiberling.

Martin Weiner Co., Clifton, N. J., has developed in its industrial fabrics division a new nylon hose wrapping for application prior to the vulcanization of rubber hose. The new fabric is said to possess an extremely fine texture and degree of flatness, thereby importing a remarkably smooth finish to the cured hose. Claimed to outlast by far the conventional hose wrappings now on the market, the nylon fabric is processed and heat-set in the company's finishing plant, with all production operatons under close control of quality. The industrial fabrics division offers a complete line of engineered fabrics for coating, laminating, and allied uses in the rubber industry.

Towe Cyanamid President

Kenneth C. Towe on January 22 was elected president of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., to succeed the late Raymond C. Gaugler. The new president, a director of the company since 1939, has been with the Cyanamid organization since April 26, 1926, when he started in the accounting department. He progressed through the positions of assistant treasurer and comptroller and was appointed treasurer on April 4, 1939. On May 15, 1945, Mr. Towe was promoted to vice president in charge of finance, a position he occupied until elected president.

Mr. Towe is also a director of several companies associated with American Cyanamid, including Porocel Corp., Southern Minerals Corp., Southern Pipe Line Corp., Southern Petroleum Corp., North American Cyanamid, Ltd., Chemical Construction Corp., and Cyanamid Inter-American Corp.

He was born in Elizabeth City, N. C. on January 19, 1893. After finishing secondary schools he attended Trinity College, (now Duke University). During World War I he served as a captain in the Quartermaster Corps of the United States Army. Before joining Cyanamid, he had been employed by the Roanoke Mills Co. and later by Childs Co.

In addition to his company activities Mr. Towe is a director of the Putnam Trust Co., Greenwich, Conn., and is a member of the advisory board of The Chemical Bank & Trust Co., Rockefeller Center branch.

Howard Huston, vice president, American Cyanamid Co., was elected a director to fill the vacancy created by the death of Mr. Gaugler.

Commodity Exchange Elects

William Reid was elected president of Commodity Exchange, Inc., New York, N. Y., at its organizational meeting on January 22. A partner since 1936 of Bache & Co., member of leading stock and commodity exchanges, Mr. Reid is also a director of the Wool Associates of the New York Cotton Exchange and of the New York Coffee & Sugar Exchange.

Joseph Fischer of Joseph Fischer & Co. was elected treasurer of the Commodity Exchange.

The following vice presidents were also named: Theodore A. Lauer, E. F. Hutton & Co.; George Elbogen, Geo. Elbogen & Co., Inc.; David D. Haldane, Littlejohn & Co. Inc.; Hans A. Vogelstein, of American Metal Co., Ltd.

Alan L. Grant, of Charles T. Wilson Co., Inc., and Samuel Swerling, of Swerling Bros., were elected to the board of governors to represent the rubber group.

Rubber Corp. of America, 274 Ten Eyck St., Brooklyn 6, N. Y., is offering a new line of RC Plastisols for use in slush casting, dipping of wire baskets and metal parts, and other applications. These plastisols are formulated to meet the most stringent heat and light stability requirements. Rigid production controls insure uniform quality, extended storage life, and stable viscosities. The company maintains a laboratory and free consulting service for the development of plastisols to meet individual requirements.

Merger Consummated

The combination of Sharples Chemicals Inc., with Pennsylvania Salt Mfg. Co., both of Philadelphia, Pa., through an exchange of common stock has now been effected, George B. Beitzel, Pennsalt president, announced last month.

For the present, Mr. Beitzel said, Sharples will continue to operate as a separate unit of Pennsalt, with, however, an exchange of technical information and coordination of some policies to the mutual benefit of both organizations.

Philip T. Sharples has been elected a director of Pennsylvania Salt. He is also chairman of the board and former president of Sharples Corp. and Sharples Chemicals, president of Sharples Oil Co., and a director of Sharples Centrifuges, Ltd., of Great Britain and other foreign Sharples Corp. subsidiaries.

Baldwin Weighing System

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa., has announced that a Baldwin automatic weighing system is in use in the Woonsocket, R. I., plant of United States Rubber Co. to provide accuracy in weighing raw materials for foam rubber products. Eight 2,000-gallon latex churns have been equipped with the system which utilizes eight SR-4 Load Cells of 10,000 pounds' capacity each. These cells provide one of three symmetrically placed supports for each churn, and each cell is connected through an eight-point switching unit to a direct reading 20,000-pound indicating controller. The indicator is calibrated to read directly the weight of the churn's contents. The controller is set for any weight up to 16,000 pounds and automatically shuts off a solenoid valve in the proper fill line when this weight is reached. A high-limit alarm guards against overfilling; while a low-limit alarm indicates when the tank is nearly emptied. In addition to high accuracy, the system also minimizes the attention required when the churns are being filled or emptied.

Improves Profilograph

Timken Roller Bearing Co., Canton 6, O., has modified its Profilograph to the point where the machine can check the surface finish and geometry of high polished steel spheres or cylinders to within one millionth of an inch. In use, the surface of the object to be measured is mounted on a flat, delicately adjusted table fitted into a special bearing. A hinge, mounted just above the specimen, has a diamond needle and a tiny mirror at the end of the hinge. As the mounting table turns, the needle traces over the surface of the specimen. Any variation in that surface wiggles the needle and the mirror, moving a tiny beam of light played on the mirror. Through a series of other mirrors the light beam is transmitted on to a photographic film which records the surface variations on the specimen. By changing the length of the light beam, surface variations can be magnified up to 5,000 times their actual size.

George J. Muntean has been advanced to the position of assistant superintendent of the Canton bearing factory. He has been with Timken 19 years.

New Hercules Plant

Hercules Powder Co., Wilmington, Del., plans erection of an $8,000,000 plant for the production of phenol, para-cresol, and acetone by a new process. Scheduled for completion in 1953, the plant will mark the entry of the company in the field of chemicals produced by hydrocarbon oxidation. Phenols will be produced from aromatic hydrocarbons, and cresols from terpene hydrocarbons by a unique oxidation process. The heart of this process is a basic intermediate step involving the production of organic hydroperoxides, which are then readily converted to phenols. The plant will be in the Delaware River industrial section because both propylene and benzene, required in the phenol process, are readily available there from petroleum refineries and coke ovens in the area. Terpenes, the raw materials for the para-cymene process, will come from Hercules' naval stores operations in Georgia and Mississippi.

Development of the new phenol process is the culmination of a research program carried on during the past 15 years. Unlike existing processes, the new method does not consume sulfur or chlorine, both in critical supply. The simplicity and the versatility of the Hercules process are such that other substituted phenols and phenolic materials may be produced at will, with only minor equipment modifications. When patent applications were filed, it was discovered that an equivalent process was under development by Distillers Co., Ltd., working independently in England. Hercules acquired the United States patents and patent applications of Distillers. The process for manufacturing phenol and acetone has been licensed to B. A. Shawinigan, Ltd., which will construct a plant in Montreal to supply the Canadian market.

Thermoid Advances Two

A. F. Matheis has been appointed assistant sales manager of industrial rubber products at Thermoid Co., Trenton, N. J. Mr. Matheis, 24 years with Thermoid and most recently sales promotion manager of its industrial rubber products division, will work directly with Thermoid Vice-President Lloyd R. Leaver, Manager of the industrial rubber division.

Carroll Hall former project engineer with Thermoid, has been named assistant factory superintendent of Essex Rubber Co., a Thermoid subsidiary, at Trenton. Mr. Hall at one time was associated with E. I. du Pont de Nemours & Co., Inc., and later was superintendent of the United States Rubber Co. plant at Providence, R. I., before joining Thermoid.

J. M. Huber Corp., 100 Park Ave., New York 17, N. Y., through Vice President R. H. Eagles has announced construction of a plant to produce chemicals and pigments at Havre de Grace, Md. The plant will be under the supervision of John R. Lill, manager of the company's chemicals division, and production is expected to start within three months. One of the first new products from this plant will be a reinforcing white pigment, Zeolex 20, described as a silico aluminate. This material has been under research and development for several years and is expected to find active demand in the rubber and plastics industries.

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SEE REVERSE SIDE

Goodrich Chemical Changes

John R. Hoover has been elected president of B. F. Goodrich Chemical Co., Cleveland O., it was announced last month by John L. Collyer, president, The B. F. Goodrich Co., Akron, O. Hoover succeeds William S. Richardson, whose increased responsibilities as vice president of the parent company will include the chemical firm. He will continue to make his headquarters in Cleveland, where the chemical concern has its main offices.

Hoover, formerly sales vice president of Goodrich Chemical, joined the Goodrich organization in 1925 as a chemist in the works laboratories in Akron. He then moved into the footwear division and later became manager of the works laboratories. His sales career began in 1932 when he was made assistant sales manager of the company's rubber lined equipment department and the sale of other products for the chemical industry. He later became sales manager of that department and in 1942 assumed direction of Goodrich plastics materials sales. When Goodrich Chemical was formed in 1944, Hoover was made general sales manager and was elected vice president of sales in 1945.

Hoover was graduated from Harvard University in 1925 with a degree in chemistry, has been president of Plastic Materials Manufacturers Association, Inc., and is a member of the Society of the Plastics Industry, the Society of Plastics Engineers, American Institute of Chemical Engineers, and the Chemists' Club of New York.

The new president later reported that James C. Richards, Jr., has been elected vice president, sales, and Allyn I. Brandt appointed general merchandising manager of the company.

Richards was formerly manager of International sales; while Brandt, former general sales manager, assumes increased responsibilities in his new post. His broadened duties include supervision of merchandising policy and procedures of export as well as domestic sales. He also will supervise government relations.

Richards started with Goodrich in 1934 as a chemist in the general chemical laboratories in Akron. From 1935 until 1938 he was a chemical engineer working on reclaimed rubber, then was general foreman of Akron Plants 5 and 6 for five years. He became production manager of the government's synthetic rubber plant at Louisville, operated by Goodrich, in 1943 and in 1944, plant manager of the government plant at Borger, Tex., also operated by Goodrich. In 1946, Richards was named head of the Hycar rubber and chemical sales department of Goodrich Chemical and in 1949, manager, International sales.

Brandt came to the Goodrich company in 1930 as technical assistant to the vice president, industrial products. He was later made vice president of the Philadelphia Rubber Works Co., the reclaimed rubber subsidiary of B. F. Goodrich. With the formation of Goodrich Chemical in 1945, he was appointed general domestic sales manager.

Orville E. Isenburg now is International sales manager. He started with The B. F. Goodrich Co. in 1941. After doing rubber and plastics research, Isenburg joined the sales staff in 1942 and was transferred two years later to the chemical division, which later became B. F. Goodrich Chemical Co. His various technical and sales positions have included staff representative for plastics materials and his most recent position as field sales manager—plastics materials. He is a member of Society of Plastics Engineers, Society of Plastics Industry, American Institute of Chemical Engineers, and Cleveland Junior Chamber of Commerce.

John R. Hoover

For More Synthetic Rubber

A new technique that will boost the production capacity of synthetic rubber by 26% is being used at the Institute, W. Va., plant operated for the government by Goodrich Chemical. The process, which uses sugar and other activators, was developed by the company and, according to Mr. Richardson, is the first to be applied to the production of synthetic rubber made at 122° F.

Reclaimers Elect

Rubber Reclaimers Association, Inc., 250 W. 57th St., New York 19, N. Y., last month held its annual meeting at which the following officers were elected: president, Fred E. Traflet, vice president, Pequanoc Rubber Co., Butler, N. J.; vice president, Gilbert K. Trimble, executive vice president, Midwest Rubber Reclaiming Co., East St. Louis, Ill.; secretary-treasurer (reelected), Charles T. Jansen, advertising manager, *Rubber Age*, New York.

A new board of directors also was named, including R. E. Casey, general sales manager, Naugatuck Chemical Division, United States Rubber Co.; Irving Laurie, general manager, Laurie Rubber Reclaiming Co.; C. R. Shaffer, president, Xylos Rubber Co.; D. S. Morse, vice president, Bloomingdale Rubber Co.; and Mr. Trimble.

Jean H. Nesbit, president, U. S. Rubber Reclaiming Co., was reappointed chairman of the Association's executive committee.

The DeVilbiss Co., manufacturer of spray painting equipment and atomizers, Toledo, O., has been informed by the Economic Co-operation Administration of the award of a "Certificate of Cooperation," for the company's participation in the agency's technical assistance programs.

Health Institute Opens

The Liberian Institute of the American Foundation for Tropical Medicine, established as a memorial to the late Harvey S. Firestone, was dedicated at Harbel, Liberia, January 12 in ceremonies attended by President W. V. S. Tubman; Harvey S. Firestone, Jr., chairman of the board, Firestone Tire & Rubber Co., Akron, O.; and several prominent American doctors and public health leaders. The Institute, built with an original fund of $250,000 contributed by Mr. Firestone, Jr., consists of a two-story main laboratory building, service building, and staff living quarters. Speaking at the dedication, President Tubman expressed the appreciation of the government and people of Liberia for the Firestone gift and the work of the Foundation. Mr. Firestone paid tribute to the progress of Liberia and spoke of the close bonds of friendship which have existed between that country and the United States. Discussing the role of the Firestone rubber plantations in Liberia in the world rubber picture, Mr. Firestone stated that "we now have nearly 80,000 acres planted in high yielding trees, and last year we shipped more than 72,000,000 pounds of rubber."

Personnel Promoted

Promotion of Earl B. Hathaway to the position of sales manager of the Firestone company was announced last month by Harold D. Tompkins, vice president in charge of sales.

Mr. Hathaway was eastern division sales manager from 1942 to 1948, when he was named sales manager of the Akron divisions. He has been with Firestone since 1927, when he started in the college training class. His first assignment was in the tire service department at Detroit. In 1930 he was made territory salesman, in 1932, store manager in Alton, Ill., in 1936, assistant district manager in the Chicago district; and in 1938, district manager at Detroit.

L. G. Fairbank, Firestone sales manager for the past ten years, will serve as assistant general sales manager under Mr. Tompkins. Mr. Fairbank joined the company in 1913.

Victor D. Kniss, since 1944 manager of tire sales, has been appointed general merchandising manager and will coordinate the activities of the Akron staff sales departments. He started with the organization in 1933 in the stores division in the Detroit district. In 1935 he was placed in charge of stores in the Midwest division and in 1936 was made Grand Rapids district manager. Late in 1936, Mr. Kniss was transferred to Akron as manager of the truck and tractor tire sales department.

Frank C. McWilliams has been appointed space buyer for the Firestone advertising department, according to C. B. Ryan, advertising manager. Mr. McWilliams will take over duties formerly handled by E. H. Swinehart, who has been assigned to a new position with Firestone Plantations Co. Since 1948, Mr. McWilliams has worked in the advertising department's production division. From 1942 to 1948 he served in several capacities in the sales department of the company in Akron, except for three years of military service.

Receive Savings Bond Citation

The Savings Bond Division, United States Treasury Department, recently presented a citation to Firestone employes

for their outstanding record of participation in the payroll savings plan for the purchase of bonds. The presentation, made by Division Director Vernon L. Clark, was accepted by Firestone President Lee R. Jackson. The citation notes that 88% of all company employes are participating in the plan. The citation is signed by E. H. Foley, Acting Secretary of the Treasury.

Plastics Organization Activities

New Velon plastic patterns for chrome dinette furniture and other upholstery applications have been introduced by Firestone Plastics Co., Pottstown, Pa. Designed by Walter M. Litter, the patterns are styled to complement both modern and traditional decorative schemes. Printed on 12-gage film the dinette-type patterns include Cathay, a diagonal dry brush modern plaid effect; Calico, a diminutive textural design; and Pola, a modern circle-and-square with mottled treatment. Each pattern is available in a full line of decorator colors. New three-dimensional embossed patterns with deep fabric-like textures are a non-directional design, called Pinwheel, and a large repeating floral design named Carnation. There patterns are available in standard upholstery gages, and they also come in a new color line selected for the new designs.

More than 1,000 guests were entertained by Firestone at a radio and television show, concert, and buffet supper party in Chicago, Ill., on January 7 during the Mid-Winter Home Furnishings Market. The "Voice of Firestone" program was brought to Chicago as a tribute to the furnishings industry, and Velon plastics, made by Firestone Plastics, and Foamex bedding and cushioning, made by Firestone Industrial Products Co., were featured in the commercials. The buffet supper and a display of Velon and Foamex materials were held in the Conrad Hilton Hotel.

Firestone Tire & Rubber officials attending the affair were Raymond Firestone, vice president in charge of research and development, and C. B. Ryan, advertising director. Firestone Plastics representatives were President Roger Firestone; Elmer French, vice president—sales; E. T. Handley, vice president—production; and B. B. Bowling, sales manager of the Velon Flex division. Firestone Industrial Products officials included President P. P. Crisp, Vice President R. J. Mitchell, and also Foamex Sales Manager W. W. Llewellyn.

John C. Macksey has been appointed by Firestone Plastics as eastern sales representative for Velon Flex. Mr. Macksey, formerly in charge of the sale of Velon industrial films, is making his headquarters in New York in the Empire State Bldg. He replaces G. H. Smith, recently transferred to High Point, N. C.

Goodyear Appointments

K. C. Zonsius replaces the late J. K. Hough as director of advertising at The Goodyear Tire & Rubber Co., Akron, O. Zonsius, manager of automobile tire sales for the company since 1935, is succeeded as such by W. E. Still, manager of farm tire sales.

H. M. Caruthers, formerly in charge of industrial tire sales, is now manager of farm tire sales.

Zonsius joined Goodyear in May, 1917, in the Chicago district office, and except for a six-month period in the Navy during World War I, continued in this capacity until 1921, when he was appointed general Line salesman. He subsequently held positions of service department manager and assistant district manager in the Chicago district, before being appointed district manager of the Peoria district in 1929. Transferred to Akron the following year, he was appointed assistant advertising manager, continuing in that post until promoted to manager of auto tire sales.

K. C. Zonsius

Still started with Goodyear in 1937 as a budget trainee and later was budget manager for the company's stores in Erie Pa., Geneva and Rochester, N. Y. He was promoted to field representative for the Albany district in 1943. In January, 1947, he was an instructor in Goodyear's dealer merchandising conferences at New York, Newark, and Philadelphia and was named manager of farm tire sales in September of that year.

Caruthers began with Goodyear 14 years ago as a salesman in the Pine Bluff territory. On July 1, 1946, he was appointed assistant to the southcentral division manager at Dallas, Tex., was named assistant district manager at Kansas City in October, 1948, and in December, 1950, was transferred to Akron as senior staffman in the truck tire department in charge of industrial tire sales.

A. L. Steele has been appointed manager of the automotive jobber department of the mechanical goods division; his duties cover the replacement field on fan belts, radiator hose, and automobile mats. Before World War II, Steele served as manager of Goodyear's retail sales division in the retail stores department. He was made an industrial specialist in the U. S. Army Signal Corps in 1942, when he was in charge of the Oklahoma, Kansas, and Arkansas areas. A year later Steele was transferred to Goodyear Aircraft Corp., Akron, in charge of vendor inspectors. Next he was manager of the new products division on postwar planning; from 1946 to 1950, a Kelly-Springfield tire distributer in Philadelphia and from March, 1951, assistant manager of automotive jobber sales.

A. M. Recker has been made head of the newly formed commercial sales department of the aviation products division and will coordinate all replacement sales in aviation products. He joined Goodyear in 1926 at Jacksonville, Fla., in the district operating department and later served there in telephone sales and as general-line salesman. Transferred to Akron in 1942, he was assigned to the tooling division at Plant D of Goodyear Aircraft Corp. and soon after became manager of the outside production technician department. He returned to the tire company in 1944 as senior staffman in aviation products, assigned to the distributer sales department.

Robert R. Osmun has been appointed to the truck tire sales department, specializing in industrial tires. He replaces H. M. Caruthers, now manager of farm tire sales. Osmun joined Goodyear in 1947 as a field representative trainee at Columbus, O.; was made field representative there in 1948; later that year was transferred to Dayton as assistant store manager; shortly after, was assigned to Burlington, Iowa, as store manager; and in January, 1951, came to Akron as an instructor in the company's merchandising school.

Product Developments

A new type of puncture-sealing butyl inner tube has been announced by Goodyear. The butyl sealant is said to be sufficiently stabilized to maintain its position in the tube at high speeds and high temperatures and permits the tube to meet all puncture-sealing requirements without excessive weight or changes in balance under operating conditions. The tube's oversize feature tends to keep it in compression when inflated, thereby permitting the tube to compress around the hole left by a puncturing object.

The Marathon tire, a new low-price addition to its line of low-pressure tires, was announced by Goodyear. Incorporating the same basic principles as the firm's standard Super-Cushion, the new tire is designed to meet popular demand for a lower priced replacement tire. The Marathon tire is made in all standard low-pressure sizes from 6.40 through 7.60.

Goodyear's synthetic rubber plant at Houston, Tex., is currently the largest producer of synthetic rubber in the world, according to R. P. Dinsmore, vice president in charge of research and development. Operated by the Goodyear Synthetic Rubber Corp., the plant's overall production in 1951 was 100,111 long tons, a new record for any individual plant in the rubber program. Net production of GR-S type of rubber was 86,384 long tons, also a new high.

Akron Section, American Institute of Chemical Engineers, at a recent meeting elected the following officers for the coming year: chairman, John W. Kosko, a department foreman in the Chemigum plant of Goodyear Tire & Rubber Co.; vice chairman, Archie B. Japs, director of chemical research, B. F. Goodrich Research Center; secretary, Warren E. Phillips, Firestone Tire & Rubber Co.; treasure, H. H. Baker, Jr., sales engineer, White Industrial Sales & Equipment Co. The retiring chairman, Robert C. Stell, plant manager, Goodyear Synthetic Rubber Corp., was appointed to represent the organization on Akron Council of Engineering & Scientific Societies and chairman of committee on symposium for Akron, Central Ohio, Detroit, Ohio Valley, Pittsburgh and Toledo sections of A.I.C.E.

Naugatuck Appointments

Major organizational changes in the Naugatuck Chemical Division, United States Rubber Co., Rockefeller Center, New York 20, N. Y., were announced last month.

Clayton F. Ruebensaal, formerly technical director, plastics and resins, for the division, was named to the newly created position of commercial development manager and will concentrate on developing new commercial outlets for the products of Naugatuck's fundamental research. His work will include the economic evaluation of raw material supplies, plant sites, potential markets, potential competition, and investment requirements.

D. Lorin Schoene, formerly manager of organic research, succeeds Mr. Ruebensaal as manager of plastics development. Dr. Schoene will assume direction of all applied research, process development, and technical sales service activities pertaining to Kralastic molding powders, Vibrin polyester resins, Marvinol vinyl resins and other Naugatuck plastics.

A graduate of Case Institute of Technology, Mr. Ruebensaal was one of the organizers of the chemical division of the Glenn L. Martin Co., and was, in large part, responsible for the initial research, development, and production of Marvinol polyvinyl chloride resins. He joined Naugatuck Chemical in 1949 when the company purchased the assets of Martin's chemical division.

Dr. Schoene joined U. S. Rubber in 1939 as a chemist in its general laboratories in Passaic, N. J. Shortly afterward he was transferred to the Far East where he was a group leader in chemical development concerned with processing natural rubber latex. He joined Naugatuck Chemical in 1942 as a research chemist and was named manager of organic research in 1947. Dr. Schoene holds more than 15 U. S. patents in the fields of agricultural chemicals, aromatic chemicals, rubber chemicals, synthetic rubber, and plastics.

C. D. McCleary, manager of process development, has been named manager of basic research, which comprises the organic research formerly handled by Dr. Schoene. Dr. McCleary will supervise all the division's basic chemical and physical research.

He is succeeded by manager of technical service laboratories, who now will supervise process development and factory service work in connection with rubber chemicals, plastics, agricultural chemicals, and other chemicals, and other chemicals in the Naugatuck line.

C. G. Durbin was appointed manager of technical services laboratories and personnel relations, succeeding Dr. Judy. The former will supervise laboratory work on quality control and other specialized technical services for the development, production, and sales departments.

Ivan Mankowich has been made manager of reclaim development. He will supervise research and development work in connection with reclaimed rubber.

William E. Bradford has been made coordinator of industrial relations for Naugatuck Chemical and will coordinate labor relations and employe relations activties in the division's plants at Naugatuck, Conn., Painesville, O., Baton Rouge, La., Port Neches, Tex., and Los Angeles, Calif. He will continue also as industrial relations manager of the Naugatuck chemical and synthetic rubber plants, which he has been since 1948.

Mr. Bradford started with U. S. Rubber in 1914 as a factory worker in the tire plant in Detroit, Mich., and from various factory jobs to assistant industrial relations manager. In 1944 he was named service manager of the Institute, W. Va., synthetic plant operated by the company and in 1946, assistant to the factory manager in charge of industrial relations in the Naugatuck Chemical plant at Naugatuck.

G. R. Cuthbertson

U. S. Rubber Co. Changes

G. R. Cuthbertson has been promoted to assistant factory manager of the Los Angeles plant. He began his career with U. S. Rubber in 1937 as a research chemist. For the past 12 years he has been at the Detroit plant where he has held several important assignments in the tire division's research and development department, most recently as assistant director of research and development for the division. During World War II, Cuthbertson served on government consulting committees on synthetic rubber and synthetic tires. He is a member of the American Chemical Society and Alpha Chi Sigma.

A. N. Iknayan succeeds Cuthbertson as assistant director of development at the Detroit plant.

Regis W. Higgins has been appointed sales manager of drug sundries, dipped goods, and specialties in the footwear and general products division and will make his headquarters in the Providence, R. I., plant. Mr. Higgins now will be responsible for sales of rubber gloves, rubber hospital supplies, hot water bottles, ice caps, throat bags, syringes, and other flat and bulb rubber products, as well as unsupported sheeting and tension tape. He started with the company in December, 1939, as a salesman of drug sundries and specialties in Kansas City. After military service during World War II, he returned to U. S. Rubber late in 1945 as a salesman in San Francisco. He was promoted to sales manager of general products, sundries, and specialties in the Detroit branch in April, 1947, and three years later was named assistant sales manager of golf balls.

Louis J. Coppola has been made manager of government sales for the mechanical goods division, to succeed George H. Pendleton, retired. Mr. Coppola joined U. S. Rubber in 1925 in the sales department of the New York branch. All of his career has been devoted to selling operations in connection with belting, hose, packing, molded specialities, and other mechanical goods. Prior to his present appointment he was assistant manager of the government sales department.

Willis A. Gibbons, associate director of research and development at U. S. Rubber, recently was named executive secretary of the Science Advisory Committee of the Office of Defense Mobilization and is now on leave of absence from the company to enable him to devote full time to this position in Washington, D. C. The committee was organized to assist President Truman and C. E. Wilson, defense mobilizer, on matters relating to scientific research and development for defense.

Favor Stock Split

The board of directors of U. S. Rubber on January 9 recommended that the common stock be split two shares for one, with the expectation that a stock dividend of 50% of the new stock will thereafter be declared, thereby providing for three shares for the present one share.

Stockholders will be asked to vote on the proposal at the annual meeting on April 15. They will also act on the board's recommendation to increase the number of authorized common shares from 2,500,000 to 10,000,000, the remaining unissued shares to be available for general corporate purposes. There are no present plans for the issuance of such shares.

U. S. Rubber has 1,761,092 shares of common stock, par value $10, outstanding. The new shares will have a par value of $5 a share.

The board recommended the split with the expectation that it will further increase the number of shareholders. The company now has more than 16,000 common stockholders, an increase of 26% since 1945.

Forms New Division

U. S. Rubber created a new international division, January 31, to be known as United States Rubber International, Division of United States Rubber Co. The foreign subsidiary, United States Rubber Export Co., Ltd., was dissolved.

L. C. Boos, president of the export company, has been elected a vice-president of the parent company and becomes general manager of the international division.

Mr. Boos said the new name is more descriptive of overseas activities because many of the company's products are no longer exported from the United States, but are made abroad. The company's products are manufactured in Mexico, Cuba, Argentina, Brazil, Colombia, Venezuela, Uruguay, Great Britain, Sweden, and South Africa. There are sales branches or representatives in Mexico, Cuba, Puerto Rico, Jamaica, Panama, Venezuela, Colombia, Peru, Chile, Argentina, Uruguay, Brazil, Great Britain, Eire, Sweden, Belgium, France, Italy, Switzerland, Lebanon, Singapore, New Zealand, South Africa, and the Philippines.

Headquarters of the international division at 1230 Avenue of the Americas, will be moved in February to the Chrysler Bldg. East, 159 E. 42nd St.

Presenting Television Program

The tire division of U. S. Rubber has embarked on its first nationwide television show, a new comedy-variety program called "Royal Showcase." Originating in New York, the show is telecast weekly over an NBC network, it started January 13. Each show will feature an outstanding comedy star, a comparatively little known comedian, and a top-name recording artist. George Abbott will be director and master of ceremonies for the program; the Gordon Jenkins Orchestra will provide the music, and Ben Grauer will handle the commercials. The initial program featured comedians Bert Lahr and Joel Grey, and songstress Rosemary Clooney.

Opens New Branch

Naugatuck Chemical has opened a new branch office, at 1480 N. Thomas St., Memphis, Tenn., for the sale of rubber and plastic latices used in paints, adhesives, industrial gloves, balloons, dolls, carpets, and coating paper and textiles. This branch covers Kansas, Missouri, Texas, Arkansas, Louisiana, Mississippi, Alabama, southern parts of Illinois and Indiana, and western sections of Kentucky and Tennessee.

Among products to be handled by this branch are: natural and synthetic rubber latices; Lotols (compounded, ready-to-use latices); Dispersite (water dispersions of reclaimed rubber or plastics); Kralac (high styrene plastic latices); and Nitrex (acrylonitrile latices).

Arthur Thomas, Jr., has been made technical representative in charge of this office. He joined Naugatuck Chemical in 1944 as an engineer in the Pennsylvania Ordnance Works, which the company operated during World War II. He was next transferred to the Naugatuck Chemical plant in Naugatuck as a process engineer and subsequently was placed in charge of the process engineering department. In 1950 he became assistant to the sales manager for latices and aqueous dispersions of rubber.

Uscolite in Ducting Systems

Plastic ducting systems for chemical plants are now being manufactured on a large scale by U. S. Rubber's mechanical goods division. Marketed under the trade name Uscolite, these systems include tanks, liners, trays, hoppers, feeders, fume exhaust hoods, washers, stacks, fume troughs, and gutters, all specifically engineered for the handling of acids, alkalies, aliphatic hydrocarbons, and other basic chemicals. A blend of styrene plastic and nitrile rubber is being used as the major construction material because of its dimensional stability, toughness, and chemical resistance. The equipment is all-plastic in assembly, with reinforcing ribs, joints, and corners being extruded; formed sheets used for duct sides, tops, and bottoms; rivets are injection molded; bolts are machined from extruded tube stock; and joints are solvent welded with plastic solution. The finished ducts are cheaper than stainless steel, more durable than ordinary galvanized metal or wood, and easy to install because of their light weight, it is claimed.

Win AIM Certificates

Firestone Tire & Rubber Co., The B. F. Goodrich Co., and Goodyear Tire & Rubber Co., all of Akron, O., and Raybestos-Manhattan, Inc., Passaic, N. J. have each been awarded a Certificate of Management Excellence for the year 1951 by the American Institute of Management, 50 Washington News, New York, N. Y. According to Jackson Martindell, Institute president, only 298 firms in the United States and Canada were deemed eligible to receive the certificates. In the judging, credits are given for excellence in the following 10 separate fields: economic function; corporate structure; health of earnings growth; fairness to stockholders; research and development; directorate analysis; fiscal policies; production efficiency; sales vigor; and executive evaluation. In order to be certified, a company must receive 7,500 points out of a possible 10,000. The point system used is based on a continuing comparative study of 3,000 concerns.

WEST

Dow Silicone Exhibit

Dow Corning Corp., Midland, Mich., held a showing of its industrial exhibit of silicone properties and products on January 21-25 in the Governor Clinton Hotel, New York, N. Y. Some 24,000 pounds of demonstration units, parts, and assemblies are used in the exhibit to give a comprehensive picture of what silicones are and how they are being used today. Based on the premise that new engineering materials beget inventions, the exhibit has already been given private showings during the past few months in other cities, and the schedule calls for showings during the next three months in Boston, Pittsburgh, Washington, D. C., Dayton, Chicago, Los Angeles, Fort Worth, Houston, and Wichita.

The exhibit is divided into sections, the first of which demonstrates the heat stability characteristic of silicone products, including Silastic rubber, resins, electrical insulating materials, greases, fluids and oils. The usefulness of silicone products at low temperatures is demonstrated in the next section of the exhibit; while the following section demonstrates that the same silicone products are serviceable at both high and low temperatures. A section on silicone water repellent treatments shows their use on textiles, concrete and masonry walls, and glass fibers used in life preservers. The next section of the exhibit covers the use of various silicone products as dielectric materials in motors, transformers, generators, and other electronic devices, and the concluding section demonstrates the use of silicone defoamers, mold release agents, and polishing agents.

New Officers Named

Joseph Morningstar, president of Morningstar, Nicol, Inc., New York, N. Y., and of its subsidiary, Paisley Products, Inc., Chicago, Ill., manufacturers of glues, adhesives, and allied chemical products, on January 7 announced that Murray Stempel, on the board of directors, has been elected executive vice president. Mr. Morningstar is retiring as president to become chairman of the board. New president is George J. Muller; while R. Mayson Foster has been elected treasurer and a director.

Earl C. Lenz, general sales manager of Paisley Products, and Sam Schuller, technical director, both have been elected new vice presidents of Paisley Products. Mr. Lenz continues in charge of sales, and Mr. Schuller will have charge of all production and technical operations for Paisley Products. Laurent LaBrie has been elected assistant vice president in charge of the New York office of Paisley Products.

In 1931, Mr. Stempel helped found Paisley Products in Chicago, which has grown from a few feet of office space to a group of buildings at 1770 Canalport Ave., with another complete manufacturing plant in New York. Mr. Stempel is also a founding member of the Adhesives Manufacturers Association of America. He began with Morningstar in New York in 1914 and in 1941 became a director.

Morningstar maintains offices in 20 states. Besides Paisley Products, subsidiary companies are Aroostook Potato Products, Inc., Houlton, Me., and Park-Leggett-Altman, Minneapolis, Minn.

C. Muehlstein Retires

Charles Muehlstein, director and vice president of H. Muehlstein & Co., Inc., 60 E. 42nd St., New York 17, N. Y., recently retired. Charles Muehlstein, who has been closely identified with the growth and development of the company, was with the firm more than 45 years, most of which he devoted to the direction of the Chicago office.

Alfred Stein, vice president and assistant to Mr. Muehlstein in the management of the Chicago office, assumes complete management of that office. Mr. Stein has been with the Muehlstein company at Chicago since 1916.

Sales Staff Changes

G. V. Migula has joined Hewitt-Robins, Inc., 370 Lexington Ave., New York 17, N. Y., as manager of the western sales division with headquarters at San Francisco, Calif., replacing J. H. Hayden, who is retiring, but will continue in an advisory capacity.

For several years Migula & Co. has acted as West Coast agent for Hewitt-Robins in the engineering and sale of its products. Now Hewitt-Robins will take over the assets of the Migula company as well as some of its personnel.

Marion D. Austin, with Hewitt-Robins since 1947, will also join the western sales division as district manager of the Hewitt Rubber Division. Previously he had been manager of hose sales and development in Buffalo, where he is succeeded by K. L. Way, in H-R's product sales department 23 years.

Pyle-National Co., 1340 N. Kostner Ave., Chicago, Ill., has promoted Donald J. Cochran to technical director of its rubber and plastics division. Now also with that division is Wm. Exner, formerly with Mines Equipment Co.

Aero Bolt & Screw Co., Inglewood, Calif., has been appointed distributer for O-ring seals manufactured by The Parker Appliance Co., Cleveland, O. Aero Bolt will carry stocks of these O-rings in a broad size range and will offer engineering service in the application of these synthetic rubber seals to hydraulic and fluid handling systems of all kinds.

Monsanto Chemical Co., St. Louis, Mo., has appointed Edmund Greene to the newly created position of sales promotion manager of the organic chemicals division. He was sales promotion and advertising manager for the Merrimac Division at Everett, Mass., since November, 1947, and had joined Monsanto in June, 1947, in the industrial and public relations department. Previously Greene had worked for three years on newspapers in Boston, and been employed for a year by Smith, Kline & French Laboratories and by The Rohm & Haas Co., Philadelphia, for eight years.

Walter L. Campbell is the new advertising manager of the Merrimac Division. A veteran of four years' service with the United States Army Air Force in World War II, Campbell started with the division in 1949 as assistant advertising manager.

CANADA

Rubber Industry Survey

Gross factory value of products turned out by the rubber products industry of Canada in 1950 rose to an all-time high of $239,185,000, a gain 34% over the preceding year's value of $178,504,000 and 22% above the previous peak of $196,308,000 in 1947, the Dominion Bureau of Statistics revealed recently.

Sixty-one establishments were in operation in 1950, furnishing employment to 21,812 persons, who were paid $54,263,000 in salaries and wages, against 62 plants with 20,729 employes earning $48,896,000 in 1949. Cost of materials used was $101,773,000, compared with $73,896,000. Plants in Ontario employed almost 70% of the persons engaged in the industry and accounted for more than 72% of the entire output; while plants in Quebec accounted for about 30% of the total employment and about 28% of production.

Production of rubber tires and tubes had a factory selling value of $135,896,000, compared with $96,672,000 in 1949; rubber footwear, $33,621,000, against $29,760,000; and other products, $69,667,000, against $52,071,000.

Stocks of Rubber Rising

Combined stocks of rubber in Canada—natural, synthetic, and reclaim—on November 30, 1951, reached 10,353 tons, against 7,944 a year earlier; while consumption fell to 6,413 tons from 7,890 tons, the Dominion Bureau of Statistics reported. Domestic production of synthetic and reclaim increased to 6,213 tons from 5,721.

Month-end stocks of natural rubber were 3,688 tons, against 3,446 a year earlier; synthetic, 4,404 tons, against 2,850; and reclaim, 2,261 tons, against 1,648.

Consumption of natural rubber totaled 2,948 tons, against 4,397; synthetic, 2,388 tons, against 2,114; and reclaim, 1,077 tons, against 1,379.

Domestic production of synthetic rubber amounted to 5,874 tons, against 5,220; and reclaim, 339 tons, against 501.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., has embarked upon an expansion program to cost about $5,000,000. Ground has already been broken for addition to the tire plant, which will allow for enlargement of the building facilities and for storage and shipping. Two stories high, the new construction will be of steel and brick and will add 142,000 square feet of floor space to the present plant. Modifications are also being made to the latter for the housing of modern stock preparation methods. It is hoped that increased production will materialize early next year, when construction will be completed. Employment for 400 additional workers is also anticipated.

Combined Enterprises, Ltd., has acquired ownership of Gutta Percha & Rubber, Ltd., Toronto, Ont., through exercise of an option to purchase all remaining outstanding shares of Combined Enterprises Holdings, Ltd., which owns all Gutta Percha shares.

OBITUARY

Raymond C. Gaugler

Raymond C. Gaugler

RAYMOND C. GAUGLER, president of American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., suffered a cerebral hemorrhage on January 10 at his home in Larchmont, N. Y., and died early the next morning at a New Rochelle hospital. Solemn High Requiem Mass was sung January 14 at St. Augustine Church, Larchmont.

He is survived by his wife, four daughters, and 13 grandchildren.

The deceased was born in Pittsburgh, Pa., 59 years ago. He received his education at local parochial schools and Duquesne University.

Before joining Cyanamid, he was with the United States Aluminum Co. and the Northern Aluminum Co. Mr. Gaugler, who had been with Cyanamid since 1917, served as assistant treasurer and comptroller and was named treasurer in 1929, vice president in charge of finance in 1939, executive vice president in 1947, and president January 5, 1951. The deceased had been a director of Cyanamid since 1929.

Mr. Gaugler was also a director of several companies associated with American Cyanamid, including Jefferson Chemical Co., Inc., Southern Minerals Corp., Southern Petroleum Corp., Southern Pipe Line Corp., North American Cyanamid, Ltd., Chemical Construction Corp., Davis & Geck, Inc., and The Berbice Co., Ltd. Besides his company activities Mr. Gaugler was a director of The Guaranty Trust Co. of New York; a vice president, member of the executive committee, and director of The Manufacturing Chemists Association; and was on The National Industrial Conference Board. His clubs include The Winged Foot Golf Club, Larchmont Shore Club, The Union League Club, and The Blind Brook Club.

Lee Rubber & Tire Corp., Conshohocken, Pa. Year ended October 31, 1951: net profit, $2,185,632 equal to $8.62 a share contrasted with $2,944,732 or $11.61 a share in the preceding fiscal year; consolidated net sales, $50,402,406, against $39,308,489

FINANCIAL

Armstrong Rubber Co., West Haven, Conn., and wholly owned subsidiaries. Year ended September 30, 1951: net income, $2,832,393, equal to $7.28 a common share, against $2,312,318, or $6.04 a share, a year earlier; net sales, $50,325,336, against $41,408,575; federal income taxes, $4,790,587, against $1,734,977; current assets, $19,186,510, current liabilities, $10,195,562, against $15,785,335 and $66,369,260, respectively, on September 30, 1950.

Boston Woven Hose & Rubber Co., Cambridge, Mass. Quarter ended November 30, 1951: net income, $230,489, equal to $2.44 a common share, compared with $270,521, or $2.91 a share, in the 1950 months; sales, $5,412,728, against $5,112,507; provision for income taxes, $278,508,

Brown Co., Berlin, N. H., and subsidiary. Year ended November 30, 1951: net profit, $7,430,040, equal to $3.17 a common share, compared with $4,021,940, or $1.58 a share, in the preceding fiscal year; consolidated sales, $72,729,617, against $53,102,469.

Collins & Aikman Corp., New York, N. Y. Nine months ended December 1, 1951: net income, $2,707,000, equal to $4.81 each on 562,800 common shares, compared with $1,632,000, or $2.90 a share, in the 1950 period.

Dayton Rubber Co., Dayton, O. Year ended October 31, 1951: net profit, $2,380,938 (a record), equal to $5.01 each on 456,341 common shares, contrasted with $2,241,015, or $4.74 each on 533,341 shares, in the preceding fiscal year; net sales, $54,602,954 (another new high), against $37,199,454; provision for federal income taxes, $3,929,222, against $2,003,000; current assets, $17,091,008, current liabilities, $8,323,953, against $13,212,477 and $6,211,145, respectively, on October 31, 1950.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Year ended October 31, 1951: net income, $48,398,950 (a new high), equal to $12.26 each on 3,903,868 common shares, compared with $33,267,561, or $8.37 a share, in the preceding fiscal year; net sales, $975,766,455 (a record), against $690,571,555; income and excess profits taxes, $75,750,000, against $39,200,000; current assets, $318,467,376, current liabilities, $117,308,920, against $247,638,461 and $72,294,336, respectively, on October 31, 1950.

Goodall-Sanford, Inc., Reading, Mass. Second half, 1951: net profit, $866,731, equal to $1.35 a common share, compared with $673,856, or $1.07 a share, in the 1950 half; net sales, $22,346,724, against $18,814,155; provision for federal taxes, $1,153,292, against $698,292.

Koppers Co., Inc., Pittsburgh, Pa. For 1951: net income, $10,818,217, equal to $6.32 each on 1,671,125 common shares, compared with $11,615,498, or $6.81 a share, the year before.

NEWS ABOUT PEOPLE

Robert W. Munson, assistant district sales manager of The New Jersey Zinc Sales Co., Inc., San Francisco, Calif., since December 6, 1950, was promoted to district sales manager on January 1. Mr. Munson started with the company on April 7, 1947 as a sales representative in the Los Angeles office.

A. L. Robinson has been made manager of Chicago, Ill., operations for Harwick Standard Chemical Co., Akron, O.

M. Melvin Sirota had been appointed Pacific Coast representative for Aldan Rubber Co., Philadelphia, Pa. Headquartered at 819 Santee St., Los Angeles, Calif., Mr. Sirota will cover the Pacific Coast and adjacent states. He formerly was associated with rubber and plastic firms in the East for a number of years and served with the United States Navy during World War II. This appointment widens Aldan representation in the United States and closely follows plant additions and improvements which provide a 64% increase in the firm's productive capacity.

Karl H. Dressel has been promoted to field engineer for the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O. Mr. Dressel, who will headquarter in St. Louis, Mo., will be responsible for contacting industrial organizations in Missouri for belting, hose, and molded and extruded rubber products. Mr. Dressel has been with Republic in inside sales work since his graduation from Ohio State University in 1950.

G. B. Richards has been elected president of OPW Corp., Cincinnati, O., manufacturer of valves, fittings, and assemblies for handling hazardous liquids. Previous to his association with OPW as executive vice president in 1949, Richards was general sales manager of the Firth Sterling Carbide & Steel Co., and of Bostitch Co. He had also served as a sales executive with Imperial Belting Co., and with Firestone Tire & Rubber Co.

G. B. Richards

Carl Pacifico recently was appointed director of the development department, Wyandotte Chemicals Corp., Wyandotte, Mich. His responsibilities include direction of all the phases of market development and technical service of new organic chemical products. Previously Mr. Pacifico had been a member of the Wyandotte field service staff, engaged primarily in the commercial development of applications for Pluronics, Wyandotte's new non-ionic detergents, and specialized grades of Carbose, Wyandotte's sodium carboxymethylcellulose. He has written several papers on the properties and applications of surface active agents. Before joining Wyandotte, Mr. Pacifico was with Calvert Distilling Co. and Publicker Industries, Inc.

Clyde Watkins last month was named director of public relations of the National Association of Waste Material Dealers, Inc., 271 Madison Ave., New York 16, N. Y. Mr. Watkins formerly was secretary and director of Controllership Foundation, Inc., and previously had been sales manager with International Plastic Corp.

W. F. Twombly, vice president, Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., at a recent meeting of the board in Chicago, Ill., was elected to a directorship.

James L. Hyatt, director of purchases for Falls Engineering & Machine Co., Cuyahoga Falls, O., has been elected secretary of the company and a member of the board of directors. He will continue to head the purchasing department. Hyatt, with Falls Engineering since 1947, is an active member of the National Association of Purchasing Agents and the National Association of Cost Accountants. He has served as a director of the Akron division of the purchasing agents' association.

Franklyn J. Emmett has been appointed sales manager of the footwear division of Tyer Rubber Co., Andover, Mass. Mr. Emmett will operate out of the executive offices in Andover and will make periodical visits to the company's New York, Chicago, and Los Angeles branches.

Donald J. Eccleston has been appointed general manager of Warwick Chemical Co., Long Island City 1, N. Y. He formerly had been manager of the textile chemical division and prior to that sales manager of Suntone pigment colors for the company. Prior to joining Warwick, Mr. Eccleston had been assistant general manager of Glasgo Finishing Co.

Walter J. A. Connor has been made general sales manager of Celluplastic Corp., Newark, N. J. He has served the plastic industry in managerial capacities with Celanese Corp. of America, Koppers Co., Inc., and U. S. Fiber & Plastics Corp. Besides managing sales of Clearsite thermoplastic containers, Mr. Connor will also be in charge of sales of custom made extruded and injection molded parts.

E. H. Johnson

E. H. Johnson, executive engineer of Farrel-Birmingham Co., Inc., Ansonia, Conn., arrived in Paris, January 8, for a two-month tour that will include France, Italy, Switzerland, Holland, and England. Mr. Johnson will inspect installations of Farrel-Birmingham rubber and plastics processing equipment in several foreign plants and will also aid the company's European agents and interested industrialists with top-level engineering advice on this type of machinery. Mr. Johnson has been with the company 36 years and has made several important contributions to the design of rubber and plastics machinery, especially relating to calendering.

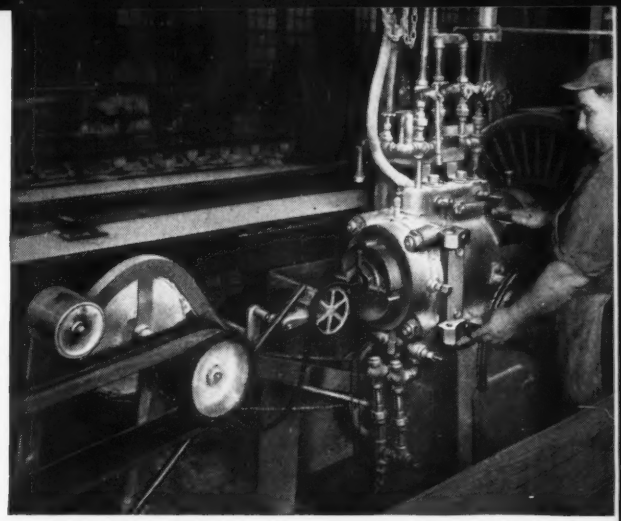
Dan Chovan, formerly with Roth Rubber Co., is now with Fawick Flexi-Grip Co., Akron, O.

Douglas P. Johnstone, formerly Chicago manager for Harwick Standard Chemical Co., will devote his full time to sales interests of General Latex & Chemical Corp., Cambridge, Mass., and S. J. Pike & Co., Inc., 30 Church St., New York 7, N. Y.

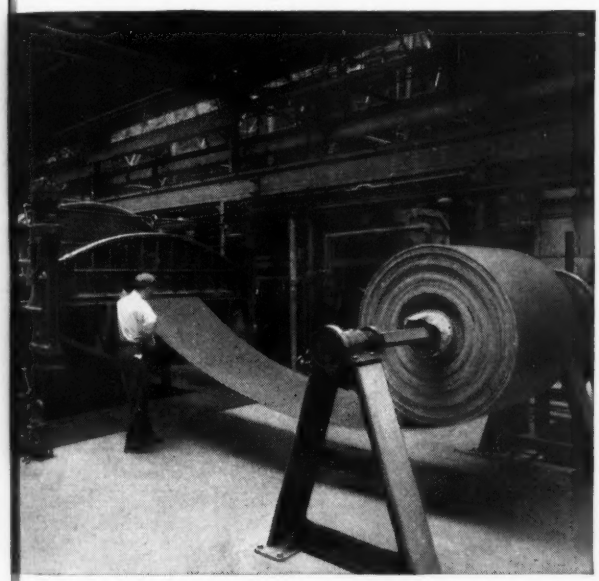
A. R. Kemp is now vice president in charge of development at Narmco, Inc., Costa Mesa, Calif.

George O. Curme, Jr., has been elected a director of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y., to succeed the late James A. Rafferty. Dr. Curme, as vice president is in charge of all research activities of the corporation. He has been honored by many awards for his accomplishments in the field of chemistry. He was granted the Chandler Medal by Columbia University in 1933; the Perkin Medal of the Society of the Chemical Industry in 1935; the Elliott Cresson Medal of Franklin Institute in 1936; the National Pioneer Award of the National Association of Manufacturers in 1940; the Willard Gibbs Medal of the American Chemical Society in 1944. He was elected a Fellow of the New York Academy of Sciences in 1950.

A TOY COMPANY saves $18,000 a year by using a Sun Rubber-Process Aid. Rejects due to blooming have been eliminated. Plasticization has improved so much that toys can now be molded in more intricate designs and with more eye-appeal.



A MANUFACTURER OF MECHANICAL RUBBER GOODS eliminated costly rejects due to scorching, by switching to a Sun Rubber-Process Aid. By properly conditioning his stock—making it easier to work—the Sun aid speeded up extruding.



A MANUFACTURER OF INDUSTRIAL BELTS improved the quality of his products and cut his inventory costs $6,000 a year by replacing five competitive aids with two Sun Rubber-Process Aids. Now able to buy tankcar lots, he saves still more.

A RUBBER SPONGE MAKER changed from ordinary processing oils to a Sun Rubber-Process Aid because it did not migrate, bloom, or affect his reclaim resin-type adhesives. This extra margin of safety has greatly accelerated production.

HOW 4 MANUFACTURERS HAVE BENEFITED FROM SUN'S RUBBER-PROCESS AIDS

By switching to Sun Rubber-Process Aids, each of these four manufacturers increased the efficiency of his plant, improved the quality of his products, and effected substantial savings. The results, condensed into a few words here, are typical, not unusual. Full information on request. More and more manufacturers are turning to Sun "Job Proved" Process Aids to cut costs, speed production, improve quality. The services of a Sun technical representative are yours for the asking. Just call the nearest Sun Office or write to Department RW-10.

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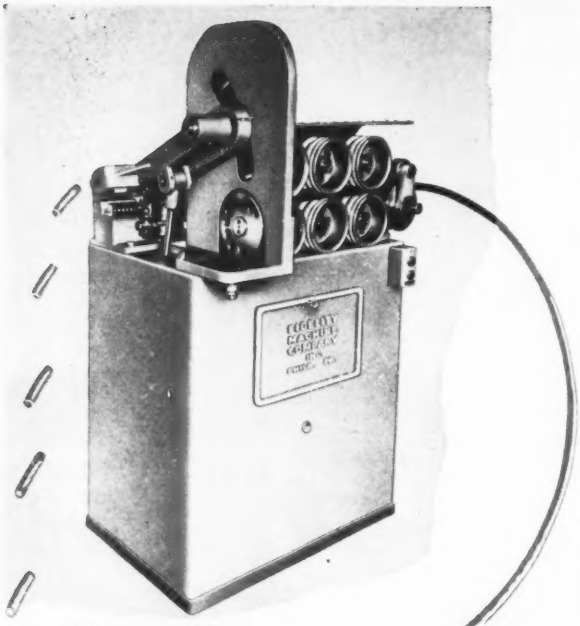

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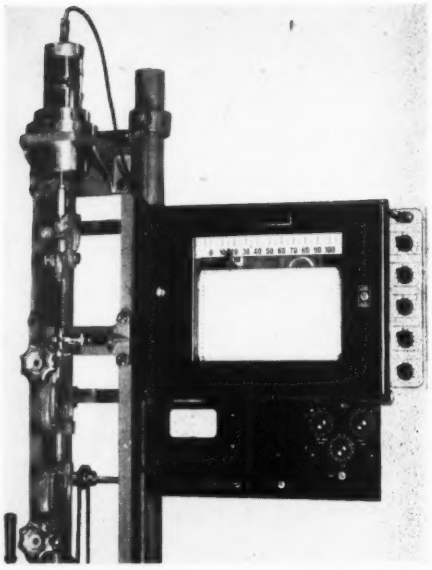

Inertialess Weighing System Installed on Scott Tester

Accessory for Scott Tester

THE Inertialess weighing system, an entirely new electrical weighing system for use on existing Scott testers of the pendulum type, has been announced by Scott Testers, Inc., 190 Blackstone St., Providence, R. I. The new system replaces the coventional pendulum-type head and recorder and converts the tester from constant-speed-of-pull operation to constant-rate-of-extension.

Specimen load is absorbed by the deflection of an elastic spool, converted to voltage, and measured by a potentiometer with a recording chart. This chart shows specimen extension on the vertical axis and load on the horizontal axis. Inasmuch as chart speed and clamp speed are both time functions, the chart becomes a stress-strain diagram with either the load or extension vari-

Stress Plus Heat?

SEE PAGE 518

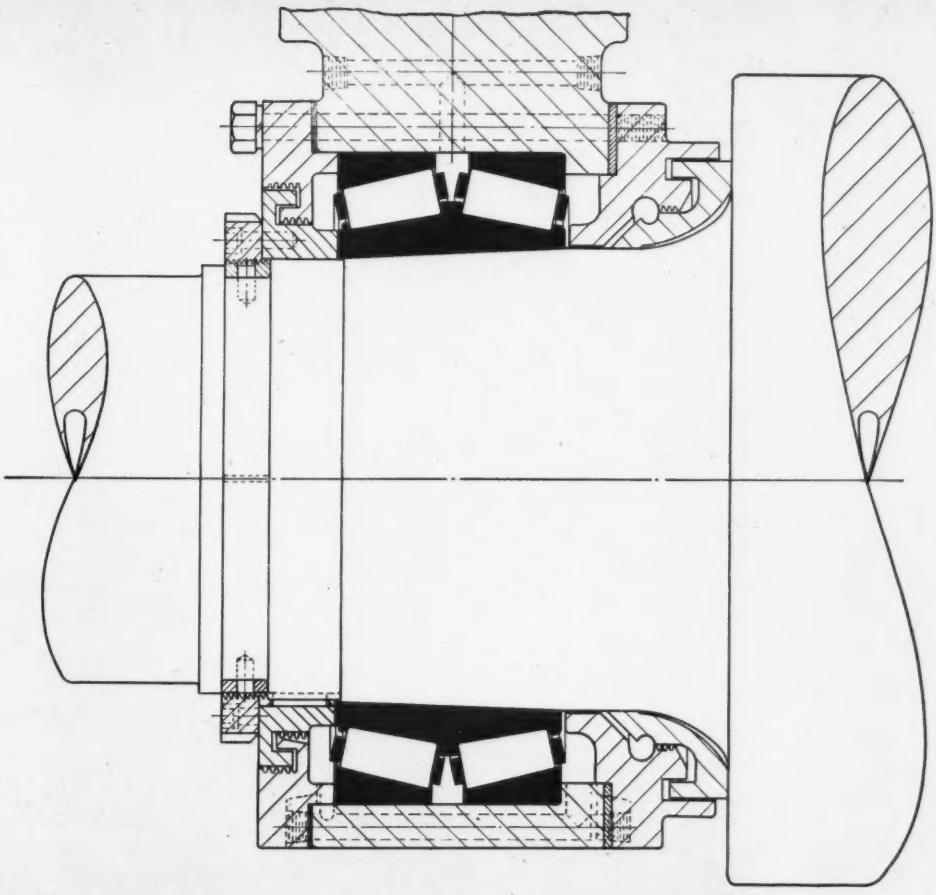

Diagram shows typical application of Timken bearings on calender rolls.

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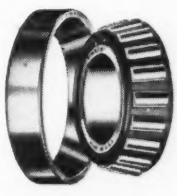
Timken bearings may be properly adjusted to assure free rotation, without looseness, when the calender rolls come up to operating temperature—maintaining accurate control of gage. Since rolls are held in positive alignment, vertical roll movement is minimized.

Due to tapered construction, Timken bearings take any combination of radial and thrust loads. True rolling motion and incredibly smooth surface finish make friction negligible. Roll neck wear is eliminated. Maintenance costs are cut.

No other bearing can give you all the advantages you get with Timken bearings on calenders, mills, refiners, and mixers. For full information, write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

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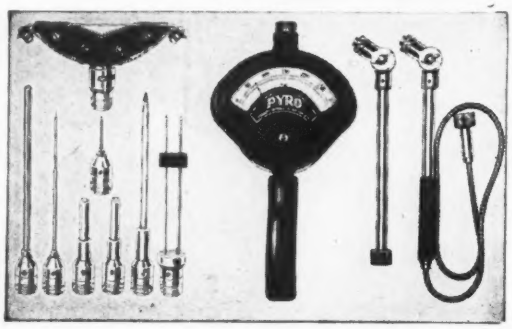

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ables magnified or condensed, as desired. Advantages of the new system are: (1) inertia is practically eliminated from the weighing mechanism, giving improved sensitivity; (2) a constant rate of extension is now possible; and (3) the flexibility of drive and recorder speeds and the wide range of chart speeds available permit new studies of progressive test changes.

Application of the new system to existing Scott testers is simple, and the mechanism can be installed on Models J, L, Q, and X-3. The replacement requires about 30 minutes and consists of removing the pendulum head by loosening four bolts and installing the elastic spool head with the same bolts. The potentiometer replaces the old recorder in a similar fashion. Conversions are available in capacity ranges of 2-10 pounds up to 400-2,000 pounds. Changing from one capacity to another is readily accomplished by changing the elastic member rather than the entire head.

Philips Universal pH Meter with Chemical Assembly *(Left)*

New pH Meter

A NEW Philips Universal pH meter built for reliable and rapid service has been announced by North American Philips Co., Mt. Vernon, N. Y. For use in laboratory research and industrial testing purposes, the meter provides a measuring accuracy of 0.01 pH over a range from 0-14.15 pH; absolutely currentless measuring with no phenomena of polarization; and zero indication by cathode ray tube; this meter can be used with glass, quinhydrone, hydrogen, and platina electrodes, being directly calibrated for the first three types of electrodes.

The meter is supplied with a new, removable calomel and glass electrode; has controls which correct for temperature variations and for asymmetric potentials, has a built-in cadmium standard cell and flexible cable with plug for connection to a 60-cycle a.c. power supply circuit; and has transformer taps which can be changed to accommodate voltages of 110, 125, 145, 200, 220, and 245. The meter is enclosed in a wood cabinet weighing 46 pounds and measuring 16⅜ by 13⅝ by 10 inches in size.

An auxiliary chemical assembly, also enclosed in a wood cabinet, is available as an accessory to the pH meter. This assembly consists of two glass electrodes; one saturated calomel reference electrode; one quinhydrone electrode; one support with electrode holder; three glass beakers; one funnel for filling the calomel electrode; one curved extension for the calomel electrode; one 0-50° C. thermometer; one bottle containing 10 grams of quinhydrone; one bottle of potassium chloride crystals; one bottle for saturated potassium chloride solution; three tubes of buffer tablets; and one tube with spare rubber lead and stoppers. The metal-lined cover of the chemical cabinet is coated with corrosion resistant lacquer and can be used as a measuring board.

"Baldwin Sonntag 12,000 Pounds Capacity Universal Testing Machine, Model 12-H." Bulletin 336. Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. 4 pages. This bulletin describes and illustrates the design features, construction, and operation of a new universal tester, a smaller and faster operating version of the standard Model 60-H machine.

An 800 TON HYDRAULIC PRESS....

FOR THE PRECISION MOLDING OF RUBBER PRODUCTS

THIS Erie Foundry Company 800 Ton Precision Hydraulic Press is designed and built to close tolerances. A number of these special presses purchased by one of the nation's largest rubber processors, are required in precision molding of special rubber products. Your specifications for precision presses are in capable hands when you send them to Erie Foundry Company. A half century of engineering and craftsmanship is at your command. Write for bulletin 350.

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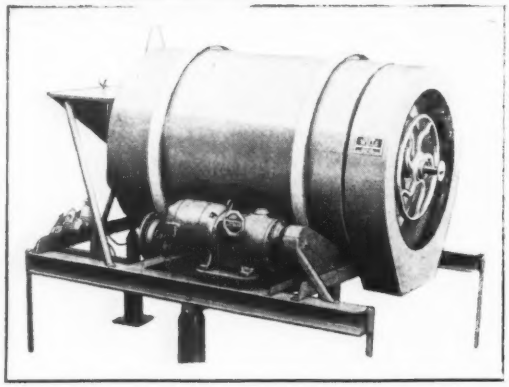

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Holds lowest temperature, with minimum "Dry Ice" consumption, by reason of our method of complete insulation. Has wide loading end hopper. Unloads automatically into tote boxes or conveyor. Product can be inspected while tumbler is rotating. Equipped with variable speed control motors. Ruggedly constructed, available in two sizes. Suitable for use with other deflashing aids or dry tumbling.

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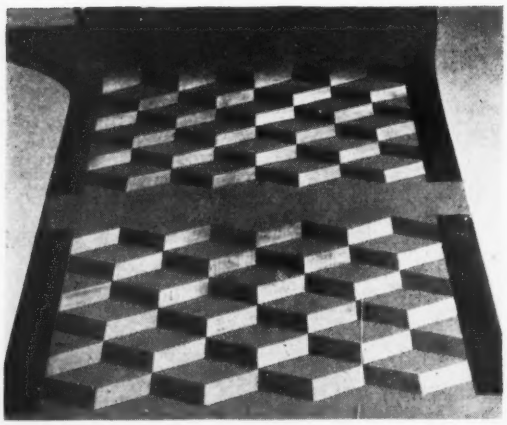
New Goods and Specialties

Fremont Rubber Stair Tread with Riser and Carpet-Like Finish

New Rubber Stair Treads

A NEW type of rubber stair tread that simulates actual carpeting has been announced Fremont Rubber Co., Fremont, O. Available for immediate shipment by the floor covering trade, the tread comes in gray, burgundy, and green and in sizes of 9 by 18 and 9 by 24 inches. The stair treads are made in two types: Fremont Standard, with a curved nose to fit the stairs; and Fremont Patented Double-Duty Tread, with a riser that gives the effect of a continuous stair covering. The top surface of the treads has a pebble-type finish which gives the appearance of carpeting, is slip resistant, easy to keep clean, and gives long wear.



U. S. Rubber's New Decorative Matting

Decorative Rubber Matting

A NEW rubber matting with a geometrical design which is highly decorative, non-slipping, and has excellent foot cleaning properties has been developed by United States Rubber Co., Rockfeller Center, New York 20, N. Y. The three-dimensional pattern combines attractive appearance with practicality, and the matting is suitable for use in hotels, theaters, cocktail lounges, and restaurants, as well as in the home. The product can also be used as a protective matting in automobiles. Made in four colors, black, maroon, red, and green, this item is available in standard mat size of 24 by 30 inches, and by the yard in 30-inch widths.

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Calcene TM enables savings to be made on delivered pound volume cost when compared with various other widely used pigments.

The ease and feasibility of using Calcene TM to replace costlier pigments—either fully or partially—warrants your prompt investigation, especially now when production economies are becoming an increasingly important factor in your business.

CALCENE TM is a specially prepared, white, coated precipitated calcium carbonate of fine particle size.

HI-SIL®

Hi-Sil is the newest of the three exclusive Columbia-Southern rubber reinforcing pigments. Hi-Sil has been used extensively in the production of non-black natural, GR-S, butyl and Neoprene compounds where an extremely high level of physical properties is required.

Improved performance in compounding and high quality result when Hi-Sil is used.

HI-SIL is a precipitated, hydrated silicon dioxide with a specific gravity of 1.95 and an average particle size of .025 micron. Hi-Sil imparts high modulus, high tensile and tear, and extremely high abrasion resistance.

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Are you looking for a white reinforcing pigment that will give you excellent physical properties? Then give first consideration to Silene EF.

Not only will you be sure of high quality in white or colored natural rubber compounds, but also in GR-S stocks.

And yet this extra quality costs you nothing more, for Silene EF is equivalent in volume cost to ordinary reinforcing pigments.

SILENE EF is a very finely divided, white, precipitated, hydrated calcium silicate.

You are invited to write for further information, free technical bulletins, or experimental working samples.

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Rubber Glove Forms

Practically any type of porcelain forms for rubber or plastic gloves can be supplied by Colonial. These include forms for linemen's or electricians', surgeons', household and industrial gloves. They can also be supplied with the new non-slip design as pictured on the middle form. Some forms are made from Colonial's stock molds, others to customers' specifications.

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FAR EAST

MALAYA

Ceylon Competition

Malaya is following with the greatest interest the talks on rubber between Ceylon and America. Ceylon reportedly has told America that if she is to reject recent tempting offers made by China to exchange high-quality rice at lower rates than Ceylon has been paying, in return for Ceylon rubber at prices above the world market, the United States would have to buy Ceylon rubber at reasonable and regular periods and at better prices. It is taken for granted here that Ceylon would also require America to buy a large part of her rubber crop.

Since the United States has already negotiated with Siam for practically all that country's rubber crop, Malaya is understandably worried at the prospect that contracts with Ceylon and Siam would lead America to reduce substantially purchases of Malayan rubber, and quite reasonably asks whether this would be a just reward for *not* selling to Communists.

The *Straits Times* of December 22, discussing the matter editorily, says:

"When the 5000-ton shipment for Communist China was being loaded at Colombo, American reaction was angry, and there were threats that Ceylon would no longer qualify for American aid of any kind. In the circumstances that threat was stupid. And it would be stupid for tempers now to be lost in Malaya, galling as it is to discover that Ceylon's refusal to embargo rubber for the Communists, as Malaya has done, may win Ceylon in the end more American aid instead of less.

"But Washington must be left in no doubt what Malaya thinks about it, while the British Government perhaps could be told once again that Malaya is no great admirer of Whitehall's handling of tin and rubber problems. It is certainly true that Washington's attitude to Malaya is conditioned by the belief that all the big decisions on rubber and tin are made in London and not Kuala Lumpur. Just what control there is in Kuala Lumpur, however, we have still to find out. Could this be an opportunity of doing so? Instead of bothering Mr. Churchill, would it be helpful if it were known that Malaya thinks that cheap rice for dear rubber would be an excellent bargain? It could be said ever so politely."

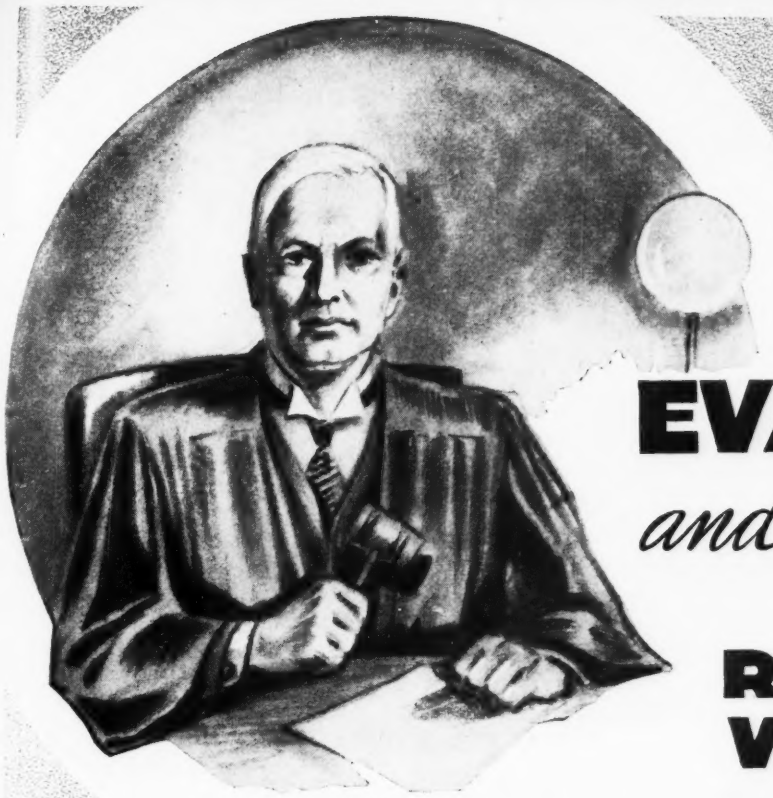
Sales to Russia

Russia is buying Malayan rubber again. In the first week of the new year, about 2,000 tons of rubber were bought through London agents on behalf of the Russian Embassy. It is believed that the British Government has alloted a monthly quota of 7,000 tons of rubber to Russia in exchange for wheat and timber. Russia was out of the Malayan market since last June and is said now to be buying for strategic stockpiling rather than for immediate consumption. Local dealers are naturally happy to have Russia as a customer again, even though, as a leading exporter is quoted in the local press as saying, most dealers are not anxious to help Russia fill her strategic needs.

Lyttelton Visits Malaya

As reported last month, Oliver Lyttelton, Secretary of State for Colonies, visited Malaya in December, 1951, to investigate the situaton there. A delegaton of 50 planters, including three Chinese, had the opportunity of expressing their views to Mr. Lyttelton, and they did so bluntly, without glossing conditions. They demanded immediate forceful action. They warned that too many senior and experienced planters had decided to leave the country, since they saw no end to the emergency because of the way the campaign was being handled; and too many youngsters were turning to fields where the hazards were fewer. The delegation warned that unless there was some striking improvement in the situation in the next few months, there was great danger that more planters would leave; that the bulk of the public had little confidence in the government; that their fear of terrorists was greater than their fear of or respect for the gevernment; and that the man in the street was not likely to cooperate unless he was better protected.

Estate workers also tended increasingly to leave because of



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Prevents adhesion of hot rubber slabs when piled . . . banishes dust nuisance by replacing soapstone or talc . . . prevents sticking during cure of extrusions and flat pan coiled tubing . . . excellent release agent for molds, mandrels, air bags, belt drums . . . equally satisfactory for washing and finishing inner tubes; imparts satiny finish . . . greatly aids in the processing of insulated wire and cable. The Production Departments and Laboratories of many rubber manufacturers, through years of using GLYCERIZED, give ample proof of its outstanding qualities as a lubricant for natural, synthetic and reclaimed stocks. Write for sample on your letterhead, then evaluate. You are the judge of the results.

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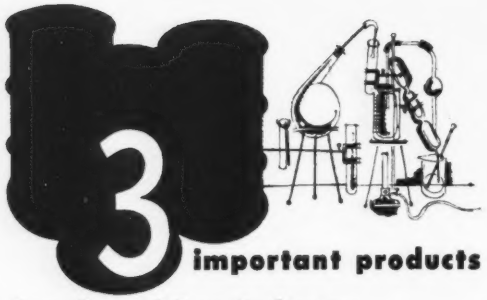

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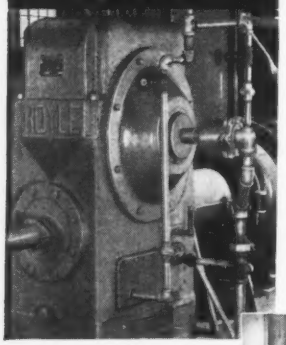
JOHNSON *Rotary Pressure* **JOINTS**

Setting a New Pace in the Rubber Industry



When it comes to admitting heating or cooling agents to rotating rolls or drums, the Johnson Joint completely outmodes the old style stuffing boxes. It saves enough in reduced maintenance alone to pay its own way quickly —it is completely packless, self-lubricating, self-adjusting and even self-aligning. In addition, it can materially benefit over-all production—by ending many causes of machinery shut-down, by its more efficient performance, by facilitating better roll drainage.

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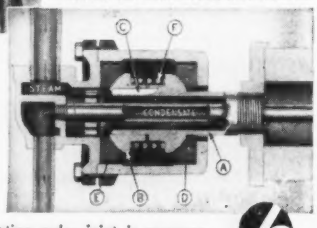

Johnson Joint installed on rubber extruder. Photo courtesy of Manhattan Rubber Div., Raybestos-Manhattan, Inc.

Rotating member consists of Nipple (A) and Collar (B), keyed together (C). Seal ring (D) and bearing ring (E) are of self-lubricating carbon graphite. Spring (F) is for initial seating only; joint is pressure sealed in operation.

The JOHNSON CORPORATION, 869 Wood St., Three Rivers, Mich.

lack of security, and the shortage of labor was already getting serious; some laborers sabotaged the trees at the instigation of the terrorists. Again the alarming proporations of rubber thefts by Communists and others were underlined; it was stated that 20% of the rubber tapped on Malayan plantations was stolen, and that the thefts were costing the industry about £25,000,000 annually. The proceeds were used to finance terrorist operations, it was asserted.

Mr. Lyttelton made a favorable impression on the delegates who seemed to feel that he would get things going. In a radio speech at the end of his visit Mr. Lytteiton let it be understood that a new military strong man would be sent to Malaya with supreme powers to wage all-out war against Communist terrorists.

Company News

Toward the end of last year and in the beginning of January, 1952, a number of companies announced sales of part or all their rubber estates, among others:

Sepang Valley Estate, in the Harper Gilfillan Group, was sold to Chinese buyers for $550,000 (Straits currency).

Cicely Rubber Estates are to sell the Kampar division, including 1,565 acres planted with rubber, for £116,670. The remaining divisions of the company, all of which are in Lower Perak, have a total area of 3,730 acres, of which 3,209 acres are planted.

The Kuala Lumpur Rubber Co. has sold Kundang Estate in Selangor for $650,000. The rubber plantings here, covering about 1,000 acres, are in a mining area, and the possibility has been considered that they would become less economical to work when rubber prices declined. The concern owns other rubber estates in Malaya, with a total planted area of 7,311 acres; its subsidiary, Sedgeley Rubber Co., has a planted area of 2,178 acres.

Tambalak Rubber Estates, Ltd., which sold its property recently, is being voluntarily wound up.

Sungei Buloh Rubber Co. and Carnarvon (Selangor) Rubber Co., which operate adjoining estates, have the same directors, and since 1937 have shared the services of the European staff and part of the Asian staff, have completed plans for amalgamation. The companies have carried out extensive replanting programs, especially since the liberation, so that at December 31, 1950, 2,194 acres, or more than 60% of the planted area, had been replanted.

INDIA

Early in 1951 an inquiry into the domestic rubber situation was conducted by the Tariff Board in India, and a brief review of its recommendations and subsequent government decisions is published in the *India Rubber Bulletin*[1]

The government agrees that the present system of protection and assistance of indigenous rubber growers by fixed statutory prices and by import control should be continued and calls special attention to the Board's recommendation that steps be taken in the proper quarters to improve the quality of native rubber and at the same time to produce as cheaply as possible. Other proposals submitted by the Tariff Board and accepted by the government included a development scheme and the creation of an All-India Rubber Research Institute. If the plans for these projects were found suitable, it was further suggested, they should have the cooperation of the Government of Madras and Travancore-Cochin, the Indian Rubber Board, and the Indian Council of Agricultural Research.

That there is ample scope for the improvement of rubber cultivation in South India is evident from the fact that, as stated by the chairman of the rubber section of the United Planters' Association of South India, the average yield per acre per annum here for 1950 was only 225 pounds, which compares with 412 pounds for Ceylon. The average in Malaya for estates over 100 acres was 597 in July, 1950.

The planted area in India is 170,000 acres, which in 1950 gave a total output of 15,500 tons. It has been suggested that by replanting with high-grade material South India should be able to provide 40,000 or even 50,000 tons per annum. Manufacturers here are particularly interested in such an increase, since they expect that their consumption, which was 21,500 tons in the first eight months of 1951, will go up to 35,500 tons by 1961.

[1] Sept., 1951, p. 7.

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PHILIPPINES

The production of rubber goods in the Philippines is due to be substantially increased in the current year, latest reports of industrial activity in this field indicate.

Jose P. Marcelo, president of Marcelo Rubber & Latex Products, Inc., announced recently that the company's million-peso shoe factory in Rizal was scheduled to begin operations early this year. The plant, in the construction of which Ro-Research Inc., Waynesville, N. C., U.S.A., cooperated, is expected to turn out 20,000 pairs of shoes daily.

A group of Filipino business men has organized a new rubber company, Marvex Industrial Corp., to produce 10,000 bicycle tires and tubes monthly, a quantity considered more than adequate to supply present needs of the Philippines. Machinery and equipment are to be bought from Japan, and it is planned to send Filipino technicians and engineers to Japan for training in rubber factories there. The company is capitalized at $500,000, and the ECA will be applied to for further financial assistance.

BORNEO

The Kuhara rubber estate in British North Borneo has been bought for £642,000 by the Colonial Development Corp. in association with Harrisons & Crosfield, Ltd. The estate, classed as ex-enemy property, has an area of 17,000 acres and an estimated yield of 3,000,000 pounds of rubber a year; its potential output is placed at 7,000,000 pounds per annum.

The Colonial Office has approved an increase in the North Borneo export duty on rubber. The colony exports 20,000 to 24,000 tons annually; hitherto the duty was at the rate of 5% up to $30 (Straits currency) per picul (133⅓ lbs.); 10% on the next $5 ($35 per picul is about 6½d per pound), and then 10% on the balance. The final levy is now raised to 15%.

BURMA

Now disturbing news is also coming out of Burma. There have been increasing threats to rubber planters and plantations in Burma's belt, and official sources indicate that these are rebel devices to raise money to buy arms to fight the government.

Recently Karen rebels gave a Burmese planter seven days to pay 10,000 rupees to prevent his 50-acre estate from being taken over. The rebels had already damaged more than 300 of the planters trees.

JAPAN

The rubber market in Kobe has reportedly been opened, following authorization by Allied headquarters.

EUROPE

GREAT BRITAIN

Export Trade Gaining

Official statistics released from month to month have revealed the steady growth in the value of Britain's postwar export business, and rubber manufactures have shared in this trend. Even when the rise in costs of raw material and production are taken

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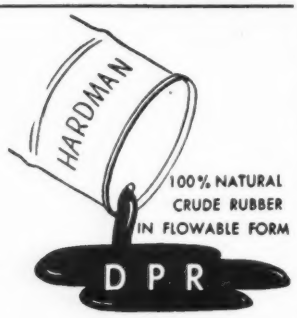

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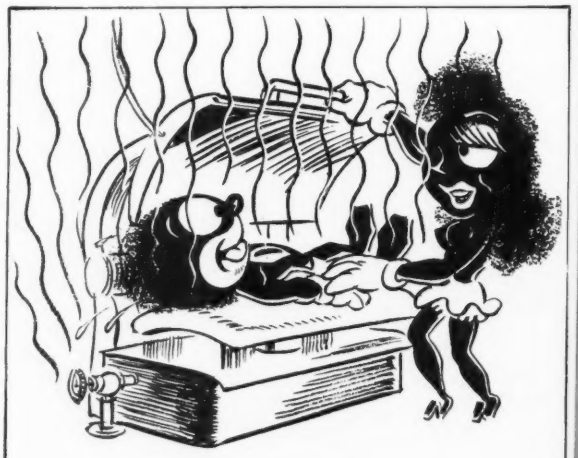
The Country's Leading Makers

into consideration, the progress made in 1950 and in the first eight months of 1951, as compared with 1949, is striking, as is indicated by the following tables taken from *India Rubber Journal*,[1] showing values in pounds sterling.

	Quarterly Average, 1949	1950—Quarters			
		First	Second	Third	Fourth
Rubber Manufactures:					
Sheeting	82,674	103,864	113,757	170,027	156,041
Proofed cloth	278,142	382,664	500,730	434,710	486,663
Thread	92,596	90,690	95,948	81,603	160,052
Tubing and hose	298,459	317,778	278,005	261,133	318,057
Flooring	83,011	91,868	128,801	122,910	155,345
Ebonite, etc.	38,836	38,175	43,894	64,440	102,760
Surgical goods	77,966	85,045	99,768	111,723	109,488
Hot water bottles	32,425	23,891	12,523	30,604	51,869
Sponge and cellular rubber	99,595	113,805	134,722	158,128	174,004
Rings	5,252	8,986	7,068	7,554	6,753
Other products	196,600	224,519	271,221	313,249	388,832
Total	1,285,556	1,481,285	1,686,437	1,756,081	2,109,864
Belting:					
Balata	40,716	38,703	45,994	45,579	47,170
Rubber and rubber-canvas	329,509	416,313	396,847	364,379	516,815
Total	370,225	455,016	442,841	409,958	563,985
Footwear:					
Boots and shoes	202,128	314,199	292,137	426,100	565,032
Soles and heels	26,709	46,031	45,785	57,787	63,581
Total	228,837	360,230	337,922	483,887	628,613
Toys and balls	125,311	124,331	176,524	204,517	183,329
Football bladders	6,477	8,045	8,542	8,300	9,605
Total	131,788	132,376	185,066	212,817	192,934

	1951—Quarters		
	First	Second	July and August
Rubber Manufactures:			
Sheeting	213,898	289,856	105,984
Proofed cloth	552,262	600,351	327,019
Thread	156,202	237,116	122,158
Tubing and hose	360,831	379,680	288,283
Flooring	156,188	161,833	109,283
Ebonite, etc.	123,664	168,396	115,415
Surgical goods	136,531	173,118	139,412
Hot water bottles	36,704	40,966	18,052
Sponge and cellular rubber	189,867	308,007	188,869
Rings	6,271	9,281	11,644
Other products	430,717	571,655	368,505
Total	2,366,135	2,940,259	1,794,622
Belting:			
Balata	52,287	70,745	29,558
Rubber and rubber-canvas	544,255	748,764	447,349
Total	596,542	819,509	476,907
Footwear:			
Boots and shoes	572,903	671,860	499,892
Soles and heels	55,850	63,951	56,118
Total	628,753	735,811	556,010
Toys and balls	218,262	313,512	115,456
Football bladders	13,404	15,167	8,216
Total	231,666	328,679	123,672

[1] Dec. 1, 1951, p. 50.



Stress Plus Heat?
SEE PAGE 518

For Processing Plastics, Rubber, Asphalt Tile

and Similar Materials . . .

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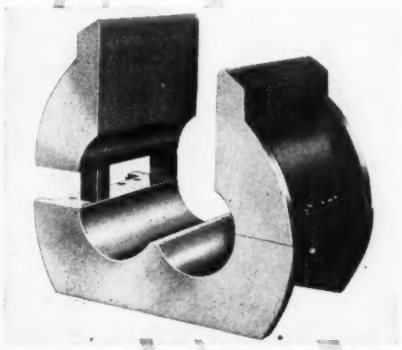
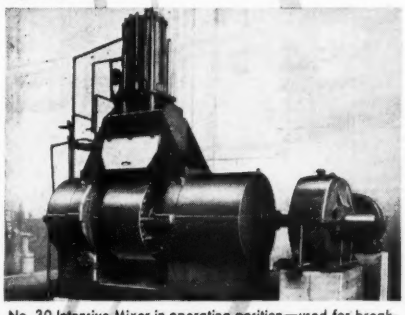


New Three-Piece Trough, easily removable, provides minimum down time for repair or replacement. Left side is blocked up to show flanged construction.



No. 30 Intensive Mixer in operating position—used for breakdown of rubber. Capacity: 165 lbs. crude rubber.

Close-up view of No. 30 Intensive Mixer, rotated to cleaning and inspection position. Will rotate to discharge directly downward.

Struthers Wells Intensive Mixers are ideal for processing plastics, rubber, asphalt tile and other materials difficult to process or of an abrasive nature. Mixing is accomplished by a pair of parallel rotors. The material is confined by a compression ram which provides intensive working action for rapid breakdown and mixing of the batch. The trough, ram and rotors permit heating or cooling as required.

The main rotating elements of the machine are contained in one integral and rugged barrel unit, which is set in trunnion stands. The mixing chamber is open only at the top, and does not have a gate or valve in the bottom. It is water-tight, and compounding oils may be placed in the mixer first if desired.

The machine is charged from the top into the mixing chamber. The cross section of this chamber is UU-shaped. For discharging, the mixing chamber is rotated until it approaches an inverted position. For cleaning and inspection it is placed in a horizontal position. A wide opening makes the chamber very accessible.

The design and construction of Struthers Wells Intensive Mixers—backed by years of research and progressive improvement—is your assurance of the ability and versatility of our engineers and craftsmen to meet your specific mixing requirements, regardless of how different or difficult they may be.

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The 1950 totals for the four categories (rubber manufactures, belting, footwear, toys and balls) work out at £7,033,667, £1,871,800, £1,810,652, and £723,193, respectively; for the first eight months of 1951, the respective totals come to £7,101,016, £1,892,958, £1,920,574, and £684,017. With the exception of toys and balls, etc., the values for eight months of 1951 exceed those for all of 1950; figuring on a quarterly average basis, it will be found that values for most of the individual items come to at least twice those under the 1949 quarterly average.

Britain's best customer was Australia; Eire came next. Other good customers included Belgium and the Netherlands, the Scandinavian countries and Italy. The increase in the values of the business with Italy, especially in belting and general rubber manufactures was particularly notable. Values of purchases of belting also showed a relativey high increase for Chile and Colombia. Malaya and Singapore also seem to have increased their purchases of belting substantially of late.

The rise in the value of exports of rubber goods to the United States during 1950 and 1951 is worth mentioning. Whereas the quarterly average for the categories named came to £10,562 in 1949, the quarterly average for 1951 (to the end of August) worked out at over £200,000. The increase seems to have been due chiefly to much larger purchases of general rubber manufactures, toys, balls, and football bladders.

Synthetic Rubber Industry Wanted?

The idea of starting a synthetic rubber industry in the United Kingdom is one with which the British rubber industry has been becoming increasingly familiar. When G. E. Beharrel, managing director of Dunlop Rubber Co., speaking at the annual meeting of the Institution of the Rubber Industry in December, 1950, advocated the production of synthetic rubber here, he created something of a sensation. For it was the first time that a leader of the industry had formally spoken in favor of synthetic rubber.

But the subject has been discussed more and more frequently since then so that Sir Clive Baillieu, chairman of Dunlop and newly elected IRI president, caused less of a stir with his speech at the Institution's annual dinner on December 14, 1951. Sir Clive devoted a large part of his speech to the development of the different varieties of synthetic rubber for different purposes in the United States, their costs and uses. He pointed out that the United States had created an insurance against interruption of supplies of natural rubber and a national asset of proved commercial value. Judging by experience in the development of other synthetic materials, he said, there would probably be an increasing diversity of use of synthetic rubber over the whole field of competitive industry. Therefore, he continued, it was time for the United Kingdom to note these fundamental changes in the structure of the industry and for all interests in the country—government, chemical engineering and consuming industries—to consider again what action could be taken to establish the manufacture of synthetic rubber here. Dunlop, he added, would continue to cooperate in practical measures to that end. At the same time he emphasized that his own company continued to place the highest importance on the assurance of supplies of natural rubber from Malaya and Indonesia.

He then touched on the uneasy situation in Malaya which, he felt, was at once a menace to British national well-being and a grave reflection on British statesmanship. He informed his hearers that Dunlop, in common with the rest of the Malayan mining and plantation industry, had had to spend a vast sum to protect its personnel and insure production from its estates—among other measures, special security officers had been appointed, and some 60 armored cars provided.

Publications of the British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Herts., England.

No. 149. **"Tautomeric Equilibria in 1:3 (4):8-Triene Type Olefins.** An investigation of Double-Bond Interaction through Two Methylene Groups." L. Bateman, J. I. Cunneen, and J. A. Lyons. 4 pages. An investigation is described which shows that tautomeric stabilization of 1.5-dienes is less than is expressed by a free energy difference at 165° of 0.1 kilocalorie.

No. 150. **"Structural Influences Determining Tautomeric Equilibria in Phenylpropenes."** L. Bateman and J. I. Cunneen. 7 pages. Study of the 3-alkyl substitution of 1-phenylpropene gives data permitting the evaluation of factors influencing the equilibrium of the reaction and the resonance energy of the styryl isomer end-product.

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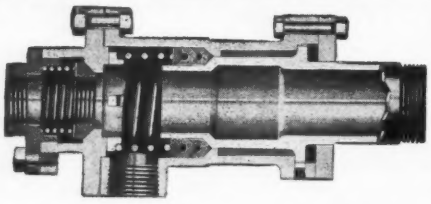

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Editor's Book Table

BOOK REVIEWS

"A. F. Holleman: Organic Chemistry." J. P. Wibaut. Translated from the Dutch Edition by Samuel Coffey. Elsevier Press, 402 Lovett Blvd., Houston, Tex. Cloth, 6½ by 10 inches, 674 pages. Price, $9.

This book is a continuation of the "Textbook of Organic Chemistry" by A. F. Holleman, the last English edition of which appeared in 1930, and retains the original treatment in that the subject matter is covered from both a structural and physicochemical standpoint. The systematic presentation insures that an insight into the historical development of the various branches of organic chemistry will be gained in addition to knowledge of current status and problems. Fundamental topics are discussed in detail from both theoretical and practical viewpoints, and particular attention is paid to stereochemical methods as means of determining chemical configurations.

The first section of the book comprises five chapters of an introductory nature and covering such subjects as analysis of organic compounds, molecular weight determination, separation and identification of compounds, and the divisions of organic chemistry. Aliphatic compounds are covered in the second section, consisting of three chapters. The third section, on carbocyclic compounds. An appendix on hints for searching the literapounds. The final sections, of five chapters, is devoted to heterocyclic compounds. An appendix on hints for searching the literature on organic chemistry, and both author and subject indices complete the book.

"The Chemical Technology of Dyeing and Printing. Vol. II. Substantive, Basic, Acid and Pigment Colors, Aniline Black, and Dyestuffs for Acetate Rayon and Synthetic Fibers." Louis Diserens. Translated and Revised from the Second German Edition by Paul Wengraf and Herman P. Baumann. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 458 pages. Price, $12.

This volume is an extension of the first book on vat, sulfur, Indigosol, azo, and mordant dyestuffs and completes the author's comprehensive and up-to-date treatment of textile dyestuffs. Features of the book include detailed discussions of the chemical reactions between fibers and dyes, explanations of the constitution and applications of proprietary textile auxiliaries, lucid explanations of the dyeing processes, and the inclusion of valuable data on all phases of the subject.

The text is divided in to eight chapters covering substantive dyestuffs; basic dyestuffs; aniline black; dying and printing of cellulose acetate; synthetic fibers; acid dyes; pigments; and special printing effects. The presentation is complete with literature and patent references, and the book includes a bibliography and a subject index.

"Handbook of Dangerous Materials." N. Irving Sax. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N.Y. Cloth, 7 by 10¼ inches, 860 pages. Price, $15.

A digest of the available literature on the hazardous properties of some 5,000 industrial materials, including trade name products, is given in this comprehensve reference work. The materials are alphabetically arranged and cross-referenced, and the information given includes toxicity, maximum allowable concentration, flammability, chemical formula, physical properties, storage and handling precautions, and shipping regulations. Where possible, detailed information is also presented on symptoms, antidotes and treatment, first-aid suggestions, fire extinguishing agent, and other pertinent data.

In addition to chemicals, individual sections written by experts in the fields are devoted to explosives, fungus diseases and fungicides, and radiation and radiation hazards. The complete text of the Interstate Commerce Commission's Shipping Regulation is also included for detailed instructions on labeling, packaging, storage, and shipping of hazardous materials. Other material included in the book are a list of references, list of abbreviations and symbols, and a comprehensive subject index.

The value of this handbook to any one involved in the production, shipping, use, or other handling of dangerous materials is self-evident. The reader, moreover, may be surprised to find that many materials dismissed as being non-toxic are actually hazardous under certain conditions. The only drawback to full utilization of the information presented is the frequent use of medical terminology without further explanation or clarification.

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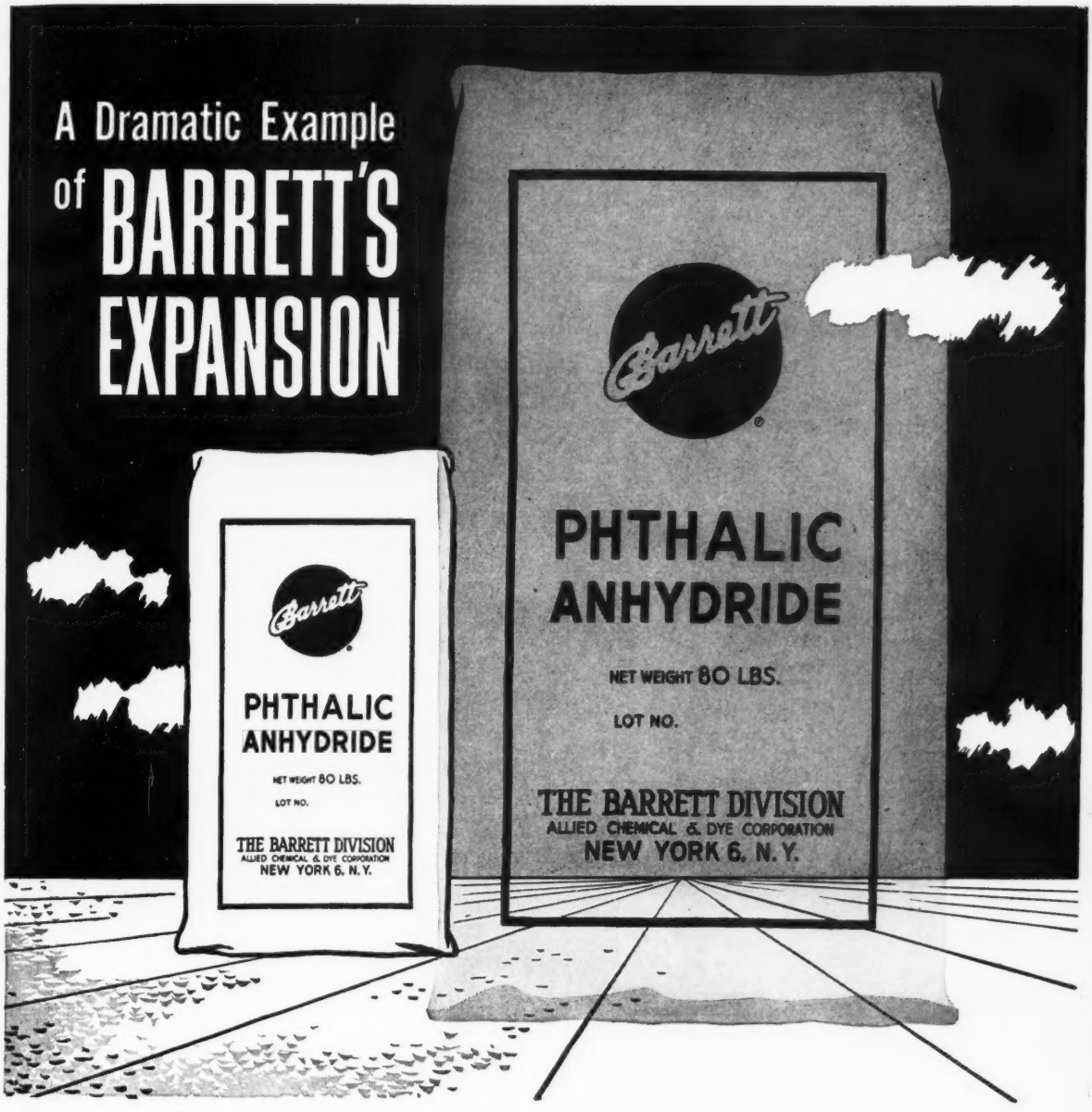

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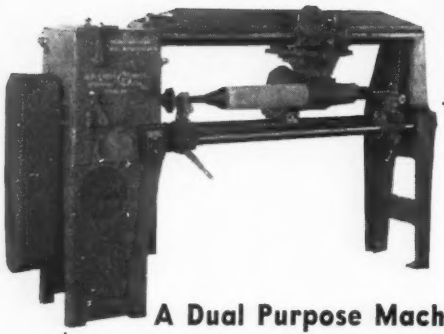

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NEW PUBLICATIONS

"Blueprint for Industry. Part VI. Tire Fabric Machinery." Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland 11, O. 28 pages. This bulletin describes and illustrates the company's machinery for the continuous processing of tire fabrics. Equipment covered includes tire cord impregnators, tire fabric cementers, calender train take-ups, complete calender trains, nylon fabric hot stretching machines, post-calender cementers, and accessory machinery such as rolls, let-offs, take-ups, cord spacers splice presses, and others.

"Rubber Substitutes." Bulletin #04-84-0-10-51. Harwick Standard Chemical Co., 60 S. Seiberling St., Akron 5, O. 7 pages. This bulletin gives specifications for the vulcanized vegetable oils available from the company and also gives information on their use in nitrile, GR-S, and reclaimed rubbers.

"X-Ray Diffraction and Geiger Counter X-Ray Spectrometric Equipment." North American Philips Co., Inc., Mt. Vernon, N. Y. 56 pages. This illustrated catalog covers the firm's equipment for X-ray diffraction, spectrometry, and fluorescence analysis, together with such components and accessories as tubes, cameras, rectifiers, specimen holders, and others.

"Naugatuck Chemical Aromatics, Chemicals, Latex, Plastics, Reclaimed Rubber, Synthetic Rubber for Industry and Agriculture." Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 16 pages. This illustrated bulletin presents condensed information on the various classes of materials, their properties and applications, made by Naugatuck for use in the agricultural, rubber, plastics, and chemical industries.

"Condensed Reference File of Bakelite and Vinylite Plastics and Resins." Bakelite Co., Division of Union Carbide & Carbon Corp., New York 17, N. Y. 8 pages. Designed as a handy reference, this booklet illustrates and briefly describes the company's molding and extrusion materials; flexible film and sheeting; protective coating resins; rigid sheets; calendering resins; and laminating, bonding, and adhesive resins.

"Link-Belt PA (Positive Action) Oscillating Conveyers." Book No. 2444. Link-Belt Co., Chicago, Ill. 24 pages. This illustrated booklet describes the company's oscillating conveyers, gives information on dimensions, capacities, power, sizes, and design features, and also details on the use of these conveyers for a wide variety of loose bulk materials.

"The Vanderbilt News." Vol. 18 No. 1. January-February, 1952. R. T. Vanderbilt Co., 230 Park Ave., New York 17, N. Y. 44 pages. This issue of the 'News' offers comprehensive information and test data on the modification of rubber compounds to obtain desired hardness values; the loading of various materials in natural and synthetic rubbers; and detailed physical property test information on natural and synthetic rubbers.

"Chemical Engineering Catalog. Thirty-Sixth Annual Edition, 1951-52." Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 8 by 11 inches, 1,797 pages. Price $20. This newest member of the series of annual reference catalogs presents information on chemical processing equipment and engineering materials offered by 482 participating companies. Reflecting the continued growth of the chemical industry, this new edition shows an increase of 117 pages over the preceding issue. A new feature is the functional guide to the classified index, wherein all of the existing headings in the regular classified subject index are grouped into 14 broad functional topics. By this means, all related subjects covered in the catalog can be seen at a glance. In addition to the functional guide and classified index, the book contains a firm name index, trade name index, and catalog section.

"Technical and Merchandising Aspects of Labeling Plastic Products." Product Information Bulletin No. 66. Monsanto Chemical Co., Springfield, Mass. 16 pages. After an introductory review of plastic labeling, this bulletin presents detailed information on type of labels, adhesive labels, merchandising functions of a good label, permanent labels (by lacquering, stamping, or printing), production methods for labeling, and label suppliers

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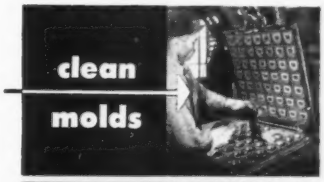

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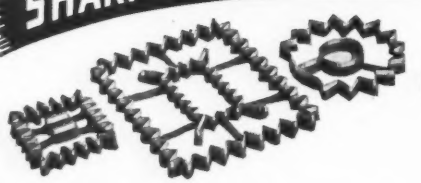

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"Baker & Adamson Laboratory Reagents and Fine Chemicals." General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 264 pages. This catalog covers more than 1,000 reagent grade chemicals, offering such data as composition, molecular weight, grades, properties, maximum impurities, and shipping containers. Of special interest are sections on the packaging of reagents and the storage and handling of chemicals requiring extra care.

"NOBS No. 1." Calco Technical Bulletin No. 823. American Cyanamid Co., Calco Chemical Division, Bound Brook, N. J. 12 pages. Data are given on the chemical, physical, and compounding characteristics of a new accelerator, NOBS No. 1, a blend of n-oxydiethylene benzothiazole-2-sulfenamide and benzothiazyl disulfide. Tables show results of tests in natural rubber and FR-S stocks containing furnace black.

"Compounding Geon Resins 101 and 101-EP." Service Bulletin G-8. B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. 16 pages. Detailed technical data on the compounding of Geon 101 and 10-EP straight polyvinyl chloride resins appear in this bulletin. The first section, on compounding ingredients, deals wth plasticizers, stabilizers, colors, fillers, ad lubricants; while the second section gives procedures and formulations for developing calendering, extrusion, and injection molding compounds.

"Webber Industrial Freezer." Webber Appliance Co., Inc., Indianapolis, Ind. 4 pages. Industrial mechanical freezers capable of producing and holding temperatures of as low as —165° F. are described in this bulletin. More than 45 standard models are listed wth specifications and special design features.

"Sorbit." Alrose Chemical Co., Providence, R. I. 4 pages. Detailed information is presented on the specifications and properties of Sorbit, a sodium alkyl naphthalene sulfonate surface-active agent, together with information on applications in polymerization reactions, textiles, detergents, and others.

"Staflex KA in Plastisol Top Coats." Deecy Products Co., Cambridge 42, Mass. 2 pages. Formulations and test data reveal that Staflex KA plastisols used in clear top coatings for sheeting provide excellent adhesion and resistance to bleeding, sweating, and blooming.

"R. R. Olin Laboratories, 25 Years Young." R. R. Olin Laboratories, Akron, O. 8 pages. Issued to commemorate the firm's twenty-fifth anniversary, this bulletin lists past and present clients and briefly describes equipment available for the testing of rubbers and plastics.

"New Improved Manhattan Single Groove V-Belts." Bulletin 6830B. Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J. 4 pages. The design and construction of the belts are illustrated and described in detail, and a list is given of standard belt sizes and numbers.

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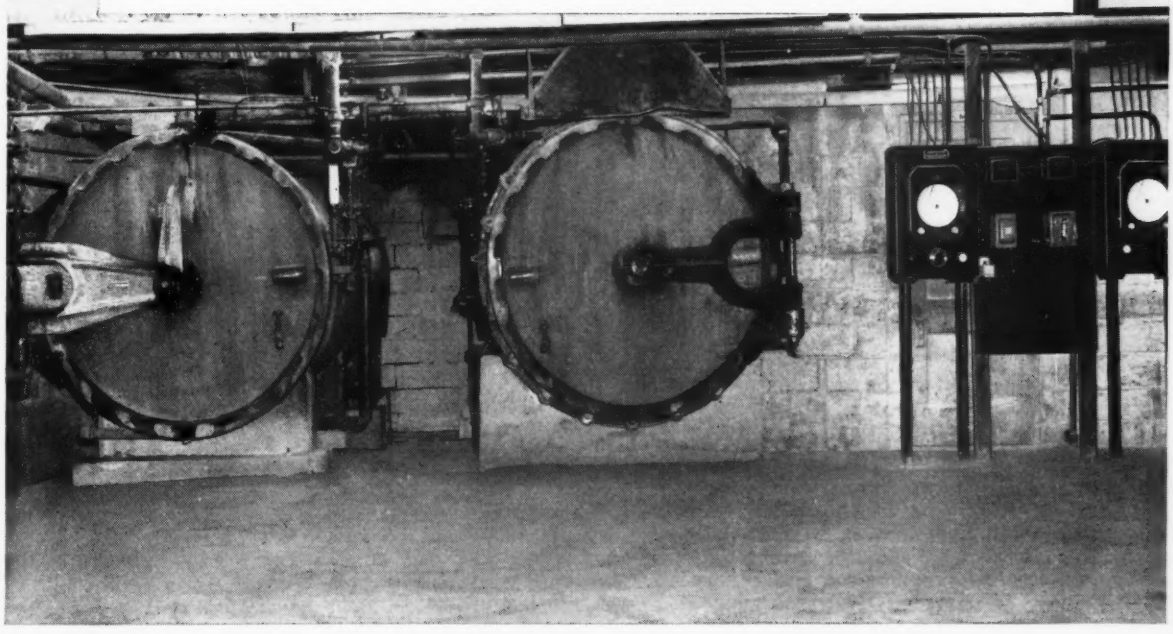
Where is everybody?



WHERE are the operators of these two horizontal vulcanizers? Right there at the right—those two panels of Taylor Instruments. Once the heater is loaded, and the door closed, they run the entire vulcanizing process for this well-known Ohio manufacturer of mechanical rubber goods. Here's what happens:

1. Closing the door actuates a pilot valve, letting air flow to the instrument panel.

2. Setting process timer puts vulcanizer under automatic control. Steam is admitted to heater through 1″ and 2″ valves, to speed come-up. Gasket is pressurized through ½″ valve. Blow-down valve vents air from heater, gradually closes. When heater pressure reaches 15 lbs., pressure switch closes and energizes electro-pneumatic pilot valve, to close gasket pressure valve.

3. Timing of vulcanizing period begins when the vulcanizer reaches proper temperature; cure temperature is maintained by a 1″ valve.

4. At the end of cure, air supply to controller is shut off by solenoid air valve. Blow down valve opens to vent heater.

5. As door is opened, all air is shut off from control panel.

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Stress Plus Heat?
SEE PAGE 518

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MARKET REVIEWS

CRUDE RUBBER

GOVERNMENT stockpile buying activities on the foreign rubber markets were reported to be light during the period from December 16 to January 15. Market prices were generally firm and held at levels above those at which the GSA is willing to buy rubber. On the domestic front, manufacturers were hesitant in placing orders for their February requirements in view of recurrent reports that GSA would reduce its February selling price.

This hesitation was justified when GSA announced on January 17 that it was lowering the selling price for natural rubber from 52¢ to 50.5¢ a pound. At the same time GSA announced that it will soon step out as exclusive buyer of foreign crude rubber. Administrator Jess Larson said that by April 1 he expects to announce a precise data for ending exclusive government buying. The price reduction was reported to have been made over the objections of rubber goods manufacturers who wanted a delay until April 1 because their pricing structure is on a quarterly basis.

There was no official comment on reports that GSA will allow industry to resume buying of natural rubber overseas in April or May. Under this reported plan privately bought rubber could not be used until July 1, and manufacturers would continue to fill their needs in the interim by purchases from GSA. While some reduction in natural rubber prices is expected to take place this year, the combination of private purchasing and government stockpile buying will probably prevent any serious price decline.

Latices

THE December 14 revision of Allocation Order M-2, effective January 1, permits private importation of *Hevea* latex after March 31, provided the importer has written authorization from GSA. It is obvious that GSA will not authorize such imports until suitable arrangements have been made for the disposal of its stock. Since most latex requires six to eight weeks transit time from producing areas, GSA is expected to permit private shipments starting in February or March to avoid any interruption in supplies.

Other latex provisions of the current M-2 are no limitation on the amount of *Hevea* latex which can be kept as inventory; continued monthly filing of a consumption report; continued monthly filing of a report by importers as to scheduled and estimated imports; and elimination of Appendix B, which restricted production of so-called less essential products.

October figures on *Hevea* latex show imports of 3,448 long tons, dry weight; consumption, 3,844 long tons; and month-end stocks, 6,024 long tons. Preliminary figures for November include imports of 2,620 long tons, dry weight; consumption, 3,702 long tons; and month-end stocks, 5,691 long tons. Bulk *Hevea* latex prices remained unchanged during January.

The consumption of GR-S latex continues to increase, with the 1951 average monthly consumption expected to be more than 2,600 long tons. This may be compared with average monthly consumption of 1,600 tons in 1949 and 2,300 tons in 1950. October production of GR-S latex totaled 3,016 long tons, dry weight; imports, 175 long tons; consumption, 2,729 long tons; and month-end stocks, 3,722 long tons. Estimates for November give a production of 2,264 long tons, dry weight; imports, 208 long tons; consumption, 2,896 long tons; and month-end stocks, 3,841 long tons.

Domestic consumption of both neoprene and nitrile rubber latices is also rising steadily. October production of neoprene latex amounted to 600 long tons, dry weight; consumption, 551 long tons; and month-end stocks, 1,309 long tons. Preliminary November figures show a production of 613 long tons, dry weight; consumption, 416 long tons; and month-end stocks, 1,549 long tons. Nitrile rubber latex production during October totaled 255 long tons, dry weight; consumption, 231 long tons; and month-end stocks, 527 long tons. Estimates for November include a production of 278 long tons, dry weight; consumption, 218 long tons; and month-end stocks, 523 long tons.

SCRAP RUBBER

THE scrap rubber market showed only desultory activity during the period from December 16 to January 15. Tube scrap, except for moderate business in butyl tubes, was at a virtual standstill, and trading in scrap tires was being done in a limited manner. Reclaimers were said to be well stocked with scrap tires, but continued to purchase on a replacement basis because it was cheaper to work on tires delivered to mills than to work from outdoor stockpiles of tires soaked by snow and rain. Dealers are hopeful that scrap rubber demand will increase in February, but can point to no trend upon which to base such an attitude.

The OPS announced a reduction effective February 11, in the ceiling prices on four-ply auto tire carcasses for recapping or retreading, which constitute about 95% of the total supply. The retail ceiling is reduced from $3.50 to $3, and the wholesale ceiling from $2.60 to $2.40. Simultaneously, a premium of $1 each over the four-ply carcass ceilings is established for six-ply carcasses at both wholesale and retail levels. These changes are in line with a survey of the industry which showed that prices set by Supplementary Regulation 49 on August 22, 1951, exceeded those generally prevailing during the GCPR base period.

Following are dealers' actual selling prices for scrap rubber, in carload lots, delivered to mills at the points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$19.00	$20.00
S. A. G. auto tires	18.00	19.00
Truck tires	20.00	21.00
Peelings, No. 1	55.00	60.00
2	32.00	33.00
3	29.00	29.00
	(¢. per Lb.)	
Auto tubes, mixed	5.0	5.0
Black	6.5	6.5
Red	9.0	9.0
Butyl	3.0	3.0

RECLAIMED RUBBER

THE dullness evident in the reclaimed-rubber market picture during November continued through December and was further aggravated by the normal holiday season and year-end lull. Demand for reclaim picked up noticeably during the first half of January, and the outlook for January sales was considered quite satisfactory.

Final October and preliminary November statistics on the domestic reclaimed rubber industry are now available. Final October figures give a production of 29,611 long tons; imports, 25 long tons; consumption, 27,744 long tons; exports, 970 long tons; and month-end stocks, 44,367 long tons. Preliminary figures for November show a production of 25,401 long tons; consumption, 25,002 long tons; exports, 1,271 long tons; and month-end stocks, 44,933 long tons.

No changes occurred in reclaimed rubber market prices during the period from December 16 to January 15, and prices were generally at the OPS ceilings given in our September issue, page 756.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Oct. 27	Nov. 24	Dec. 22	Dec. 29	Jan. 5	Jan. 12
Mar.	37.45	42.23	42.08	42.00	42.70	42.47
May	37.23	42.05	41.96	41.76	42.58	42.16
July	36.73	41.55	41.37	41.20	41.98	41.76
Oct.	35.50	39.00	38.99	38.85	39.43	49.35
Dec.	35.40	38.83	38.50	38.30	39.00	39.00
Mar.	35.43	38.70	38.38	38.18	38.87	38.86

IRREGULAR price fluctuations with an upward trend were noted in the cotton market during the period from December 16 to January 15. The major factors behind this advance were the better export outlook and the belief that the cotton supply picture will tighten in the latter months of the season, with resultant higher prices.

The 15/16-inch middling spot price started the period at 42.70¢, fell to a low of 42.35¢ on December 18, was quoted at 42.75¢ on December 31, rose to a high of 43.55¢ on January 5, and ended the period at 43.05¢. Similar movements were shown by futures prices, with March futures ranging from a low of 41.48¢ to a high of 42.70¢.

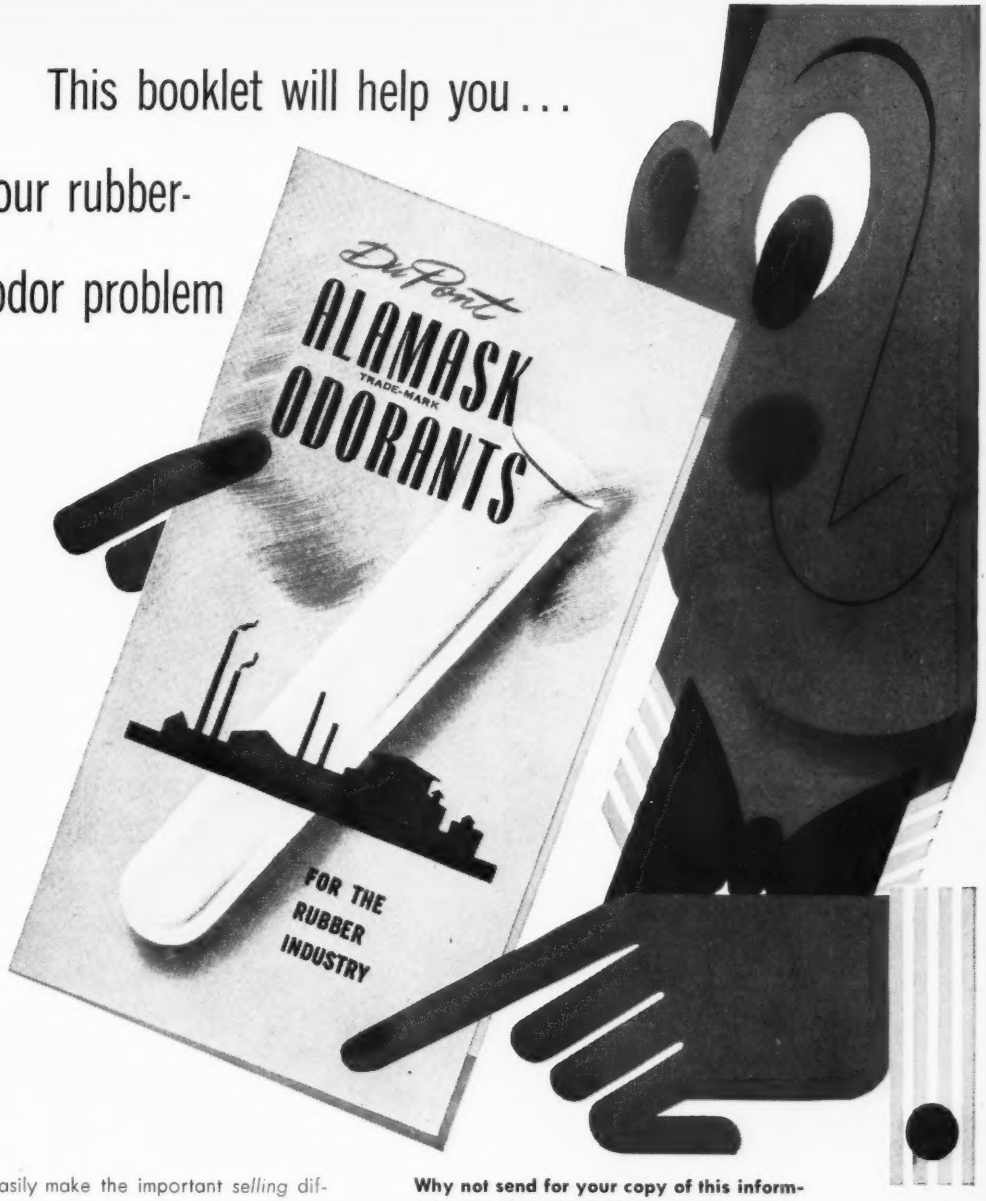
Fabrics

Hose and belting ducks enjoyed steady and substantial business despite a generally depressed and inactive gray goods market. Plant expansions throughout industry and a general trend toward conveyerized operations have resulted in a rush of orders, particularly for belting. Hose and belting manufacturers report a backlog of orders, and some plants are running several weeks behind in deliveries. While mills producing hose and belting ducks still have some production unsold for March, such a condition is considered normal since the rubber companies usually do not buy too far ahead.

Other industrial fabrics, except for army

This booklet will help you . . .

with your rubber-odor problem



Odor appeal can easily make the important *selling* difference in your rubber products. The proper odorant, too, can improve community relations by ending unpleasant odors from factory wastes. Whatever your problem, you won't want to miss the new booklet, *Du Pont "Alamask" Odorants for the Rubber Industry.*

This booklet describes many types of "Alamask" odorants and suggests their use and application . . . in latex products, dry rubber, adhesives, elasto-plastics and for plant odors.

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☐ May I have a special recommendation for our odor problem, which is (describe briefly) _____

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and numbered ducks which have been stimulated by government procurement, continued under a slack demand. Inventories on most of these fabrics were still heavy at the mills, but most customers' stocks are believed to be quite low, and an uplift in demand is anticipated during the next few weeks.

Cotton Fabrics

Drills

59-inch 1.85-yd	*yd.*	nom.
2.25-yd		nom.

Ducks

38-inch 1.78-yd S. F.	*yd.*	nom.
2.00-yd. D. F.		nom.
51.5-inch, 1.35-yd, S. F.		nom.
Hose and belting		$0.86

Osnaburgs

40-inch 2.11-yd	*yd.*	30
3.65-yd		.185

Raincoat Fabrics

Print cloth, 38½-inch, 64x60	yd.	.15⅝
Sheeting, 48-inch, 4.17-yd.		nom.
52-inch 3.85 yd		nom.

Chafer Fabrics

14-oz./sq. yd. Pl.	*lb.*	.85
11.65-oz./sq. yd. S.		.78
10.80-oz./sq. yd. S.		.82
8.9-oz./sq. yd. S.		.835

Other Fabrics

Headlining, 68-inch 1.35-yd., 2-ply	*yd.*	nom.
64-inch, 1.25-yd. 2-ply		nom.
Sateens, 53-inch 1.32-yd		.71
58-inch 1.21-yd		.775

Tire Cords

K. P. std., 12-3-3	*lb.*	nom.
12-4-2		.90

RAYON

VISCOSE high-tenacity rayon yarn, used in tire cord and fabric, established new production records in 1951. Although the final figures for December are not yet available, the yearly production was expected to total 330,000,000 pounds, as compared with the previous high of 308,000,000 pounds in 1950. Although the rayon industry has increased its output of this yarn by more than 30% since 1946, current sales are still limited only by the capacity of the industry.

Despite pressing demand for further increases in supply, rayon manufacturers cite current high costs and scarcity of building materials, as well as costs of production equipment and machinery, as reasons for their failure to boost production of high-tenacity yarn even higher. Another complicating factor is the shortage of sulfuric acid, an essential processing chemical, although the government has exempted tire yarn from the recent order limiting sulfur users to 90% of their 1950 total.

No changes were made in rayon tire yarn and fabric prices during the period from December 16 to January 15, and current prices follow:

Rayon Prices

Tire Fabrics

1100/490/2			$0.72
1650/980/2	$0.695	/	.73
2200/980/2			.685

Tire Yarns

1100/ 480	.62	/	.63
1100/ 490			.62
1150/ 490			.62
1650/ 720	.61	/	.62
1650/ 980			.61
1900/ 980			.61
2200/ 960			.31
200/ 980			.60
4 00/2934			.66

U. S. Imports, Exports, and Reexports of Crude and Manufactured Rubber

Exports of Domestic Merchandise

	September, 1951 Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	14,022	$8,638
Balata	1,750	5,938
Chicle and chewing gum bases	302,705	135,338
Synthetic rubbers:		
GR-S types	87,192	26,003
Neoprene	1,783,446	734,127
Nitrile types	356,654	187,820
"Thiokol"	3,300	1,920
Polyisobutylene	6,342	1,610
Other	21,683	21,653
Reclaimed rubber	2,172,125	200,886
Scrap rubber	2,652,222	149,940
TOTALS	7,401,481	$1,473,873
MANUFACTURED		
Rubber cement *gals.*	84,620	$186,410
Rubberized fabric:		
Auto cloth *sq. yds.*	45,014	33,109
Piece goods and hospital sheeting *sq. yds.*	62,311	63,465
Rubber footwear:		
Boots *prs.*	9,761	52,132
Shoes *prs.*	11,371	34,914
Rubber-soled canvas shoes *prs.*	12,282	32,557
Soles *doz. prs.*	14,303	45,599
Heels *doz. prs.*	55,108	68,555
Soling and toplift sheets *lbs.*	469,273	117,564
Gloves and mittens *doz. prs.*	19,831	78,952
Drug sundries:		
Water bottles and syringes *no.*	10,335	7,044
Other	.....	187,038
And rubberized clothing	.....	136,136
Toy, novelty balloons	.....	24,653
Toys and balls	.....	29,470
Erasers, except pencil *lbs.*	29,266	20,297
Hard rubber goods:		
Battery boxes *no.*	19,258	37,520
Other electrical goods *lbs.*	107,013	73,701
Combs, finished *doz.*	5,343	8,515
Other	.....	20,241
Tire and casings:		
Auto *no.*	66,178	1,033,951
Truck and bus *no.*	81,196	4,526,419
Aircraft	.....	198,420
Farm tractor, etc. *no.*	7,440	260,280
Other-off-the-road *no.*	14,427	1,490,220
Bicycle *no.*	26,986	38,902
Motorcycle *no.*	339	3,479
Other *no.*	2,330	44,555
Inner tubes: auto. *no.*	39,579	81,437
Truck and bus *no.*	61,623	307,099
Aircraft *no.*	959	7,312
Other *no.*	34,067	79,973
Solid tires: truck and industrial *no.*	1,709	60,148
Other *lbs.*	2,308	300
Tire repair materials:		
Camelback *lbs.*	386,875	135,867
Other *lbs.*	527,587	375,581
Rubber and friction tape *lbs.*	77,773	67,516
Belting:		
Auto and home *lbs.*	122,234	171,828
Transmission:		
V-belts *lbs.*	143,189	302,021
Flat belts *lbs.*	86,785	140,620
Other *lbs.*	25,362	45,769
Conveyer and levitator *lbs.*	97,553	104,128
Hose and tubing *lbs.*	673,993	555,964
Packing *lbs.*	193,164	234,142
Mats, flooring, tiling *lbs.*	385,511	121,441
Thread: bare *lbs.*	10,336	21,703
Textile covered *lbs.*	8,610	33,156
Gutta percha manufactures *lbs.*	5,181	4,220
Compounded latex and other rubber for further manufacture *lbs.*	527,390	279,532
Other natural and synthetic rubber manufactures *lbs.*	.....	436,850
TOTALS	.....	$12,420,705
GRAND TOTALS, EXPORTS	.....	$13,894,578

Reexports of Foreign Merchandise

	September, 1951 Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	59,299	$45,061
Balata	22,372	26,400
GR-S-type synthetic rubber	3,310	1,887
TOTALS	84,981	$73,348
MANUFACTURED		
Rubber-soled canvas shoes *prs.*	10,359	$16,613
Drug sundries, except water bottles and syringes	.....	750
Toy and novelty balloons	.....	105
Rubber toys and balls	.....	4,720
Tires and casings:		
Auto *no.*	20	205
Other natural and synthetic rubber manufactures	.....	105
TOTALS	.....	$22,508
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$95,856

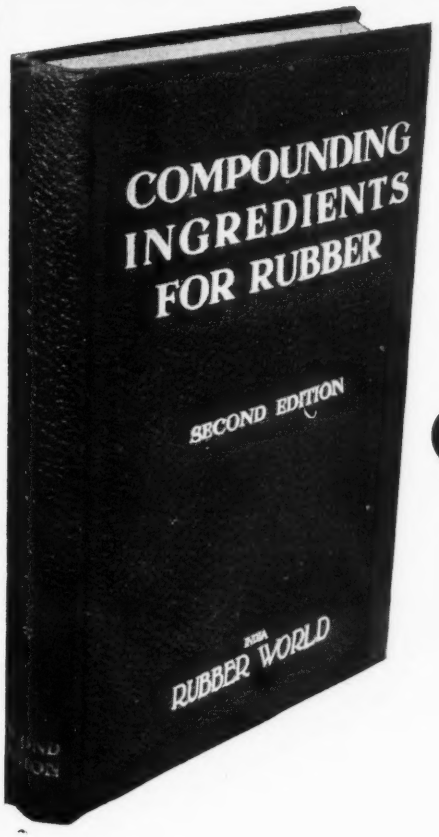
Imports for Consumption of Crude and Manufactured Rubber

	September, 1951 Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	132,851,357	$57,619,906
Latex	4,032,651	1,838,512
Guayule	270,400	78,427
Balata	687,256	227,392
Jelutong or Pontianak	138,163	105,395
Gutta percha	25,880	14,660
Synthetic rubber	1,170,695	297,915
Reclaimed rubber	94,740	9,687
Scrap rubber	2,314,838	134,680
TOTALS	141,585,989	$60,326,574
MANUFACTURED		
Tires and casings:		
Auto, etc. *no.*	2,569	$138,640
Bicycle *no.*	5,834	5,526
Other *no.*	2	160
Inner tubes, auto, etc. *no.*	115	686
Rubber footwear:		
Boots *prs.*	10,199	27,083
Shoes and overshoes *prs.*	20,952	9,056
Rubber-soled canvas shoes *prs.*	5,159	6,749
Athletic balls:		
Golf *no.*	51,888	16,167
Tennis *no.*	8,208	1,659
Other *no.*	18,324	4,180
Rubber toys, except balloons	.....	19,617
Hard rubber goods:		
Combs *gr.*	18,656	1,763
Sundries	.....	1,506
Other	.....	83,433
Rubberized printing blankets *lbs.*	771	1,698
Rubber and cotton packing *lbs.*	2,570	4,559
Gaskets and valve packing	.....	37,664
Molded insulators	.....	4,844
Belting *lbs.*	12,270	21,903
Hose and tubing	.....	7,782
Drug sundries	.....	[illegible]
Instruments *doz.*	489	[illegible]
Other rubber products	.....	[illegible]2
Gutta percha manufactures *lbs.*	3,794	1,601
Rubber bands *lbs.*	23,637	25,307
Synthetic rubber products	.....	182
Other soft rubber goods	.....	112,843
TOTALS	.....	$568,268
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$60,894,842

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

Huge Conical Dry Blender

Patterson Foundry & Machine Co., East Liverpool, O., recently completed what is believed to be the largest conical dry blender ever built. The unit is 13 feet in diameter, has a total capacity of 1,000 cubic feet, and a working capacity of more than 700 cubic feet. Developed for blending a mixture of technical gelatin and anti-foam paste, this blender holds a batch of approximately 30,000 pounds.



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Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Armstrong Rubber Co.	A & B Com.	$0.50 q.	Apr. 1	Mar. 14
	4¾% Cum. Pfd.	0.59⅜ q.	Apr. 1	Mar. 14
Brown Rubber Co., Inc.	Com.	0.25	Mar. 3	Feb. 18
Collins & Aikman Corp.	Com.	0.15 extra	Mar. 1	Feb. 19
		0.25	Mar. 1	Feb. 19
Crown Cork & Seal Co., Inc.	Com.	0.25 q.	Feb. 29	Feb. 5
	Pfd.	0.50 q.	Mar. 15	Feb. 19
Firestone Tire & Rubber Co.	4½% Pfd.	1.12½ q.	Mar. 1	Feb. 15
General Motors Corp.	Com.	1.00	Mar. 10	Feb. 14
	$5 Pfd.	1.25 q.	May 1	Apr. 7
	$3.75 Pfd.	0.93¾ q.	May 1	Apr. 7
General Tire & Rubber Co.	Com.	1.00 q.	Feb. 29	Feb. 19
Goodall-Sanford, Inc.	Com.	0.37½	Mar. 1	Feb. 15
	4% Pfd.	1.00 q.	Mar. 1	Feb. 15
	6% Pfd.	0.75 q.	Mar. 1	Feb. 15
Johnson & Johnson	Com.	0.25 q.	Mar. 11	Feb. 28
Lea Fabrics, Inc.	Com.	0.37½ q.	Feb. 29	Feb. 8
Minnesota Mining & Mfg. Co.	Com.	0.25	Mar. 12	Feb. 21
	$4 Pfd.	1.00 q.	Mar. 12	Feb. 21
Union Asbestos & Rubber Co.	Com.	0.25 q.	Apr. 1	Mar. 10

United States Rubber Statistics—October, 1951

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		
	Production	Imports	Total	Consumption	Exports	Month-End Stocks
Natural rubber, total	0	51,771	51,771	33,563	73	57,477
Latex, total	0	*3,448	3,448	3,844	0	6,024
Rubber and latex, total	0	55,219	55,219	37,407	73	63,501
Synthetic rubbers, total	†72,720					
	‡ 6,565	777	80,062	68,923	541	109,407
GR-S types§	†65,216					
	‡ 30	628	65,874	57,502	33	88,503
Butyl	†7,504	149	7,653	5,973	0	9,169
Neoprene§	‡5,212	0	5,212	4,274	427	7,796
Nitrile types§	‡1,323	0	1,323	1,174	81	3,939
Natural rubber and latex, and synthetic rubbers, total	79,285	55,996	135,281	106,330	614	172,908
Reclaimed rubber, total	29,611	25	29,636	27,744	970	44,367
Grand Totals	108,896	56,021	164,917	134,074	1,584	217,275

*Includes adjustment of +393 long tons applicable to former months.
†Government plant production.
‡Private plant production.
§Includes latices.
Source: Rubber Division, NPA, United States Department of Commerce, Washington, D. C.

Compounding Ingredients—Price Changes and Additions

Accelerators, Organic

NOBS No. 1	lb.	$0.68	/	$0.70

Carbon Blacks

(CC) Continental R-4C	lb.	.18	/	.24
(EPC) Continental AA	lb.	.074	/	.1225
Witco #12	lb.	.074	/	.1225
(HPC) Continental F	lb.	.074	/	.1225
Witco #6	lb.	.074	/	.1225
(MPC) Continental A	lb.	.074	/	.1225
Witco #1	lb.	.074	/	.1225
(HAF) Continex HAF	lb.	.079	/	.125
Kosmos 60/Dixie 60	lb.	.075	/	.1175
(HMF) Continex HMF	lb.	.055	/	.095
(SRF) Continex SRF	lb.	.04	/	.08

Plasticizers and Softeners

Thiokol TP-90B	lb.	.67		
-95, -98	lb.	.65		

Reinforcers, Other Than Carbon Black

Calco S. A.	lb.	.85	/	.88

Synthetic Rubbers and Latices

Thiokol LP-2, -3	lb.	.96		
-8	lb.	1.25		
PR-1	lb.	.95		
Type A	lb.	.47		
FA	lb.	.64		
ST	lb.	1.00		
Thiokol Latex (dry wt.)				
Type MF	lb.	.85		
MX	lb.	.70		
WD-2	lb.	.92		
-6	lb.	.70		

Tackifiers

Galex W-100	lb.	.155	/	$0.1925
-100D	lb.	.1525	/	.19

Vulcanizing Agents

Sulfur, Calco	100 lbs.	2.15	/	7.50

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, December, November, October, 1951; First 11 Months, 1951, 1950; Years 1951, 1950

	Nov., 1951	% of Change from Preceding Month	Oct., 1951	First 11 Months, 1951	First 11 Months, 1950	Dec., 1951	% of Change from Preceding Month	Total 1951	Total 1950
Passenger Casings									
Shipments									
Original equipment	1,984,015		2,101,876	25,290,342	33,878,358	1,438,453		26,728,795	36,678,352
Replacement	2,609,323		3,242,468	32,552,328	43,716,400	1,803,649		34,355,977	47,102,627
Export	68,187		78,305	659,043	575,582	67,295		726,338	641,987
Total	4,661,525	—14.04	5,422,649	58,501,713	78,170,340	3,309,397	—29.01	61,811,110	84,422,966
Production	5,698,036	—6.24	6,076,880	60,758,122	72,960,035	4,875,982	—14.43	65,634,104	78,598,174
Inventory end of month	5,422,543	+25.66	4,315,374	5,422,543	3,952,201	6,976,792	+28.66	6,976,792	3,050,301
Truck and Bus Casings									
Shipments									
Original equipment	407,798		451,256	5,054,603	4,225,511	361,342		5,415,945	4,670,783
Replacement	892,079		1,072,632	9,710,551	8,903,160	715,900		10,426,451	9,704,975
Export	119,907		103,056	826,303	726,120	130,955		957,258	788,450
Total	1,419,784	—12.73	1,626,944	15,591,457	13,854,791	1,208,197	—14.90	16,799,654	15,164,208
Production	1,652,383	—1.02	1,669,426	16,272,921	12,975,035	1,543,384	— 6.60	17,816,305	14,155,842
Inventory end of month	1,465,456	+22.29	1,198,371	1,465,456	858,048	1,796,442	+22.59	1,796,442	743,216
Total Automotive Casings									
Shipments									
Original equipment	2,391,813		2,533,132	30,344,945	38,103,869	1,799,795		32,144,740	41,349,135
Replacement	3,501,402		4,315,100	42,262,879	52,619,560	2,519,549		44,782,428	56,807,602
Export	188,094		181,361	1,485,346	1,301,702	198,250		1,683,596	1,430,437
Total	6,081,309	—13.74	7,049,593	74,093,170	92,025,131	4,517,594	—25.71	78,610,764	99,587,174
Production	7,350,419	—5.11	7,746,306	77,031,043	85,935,070	6,419,366	—12.67	83,450,409	92,754,016
Inventory end of month	6,887,999	+24.92	5,513,745	6,887,999	4,810,249	8,773,234	+27.37	8,773,234	3,793,517
Passenger (Including Motorcycle) and Truck and Bus Tubes									
Shipments									
Original equipment	2,391,514		2,548,803	30,364,512	38,031,122	1,802,955		32,167,467	41,240,397
Replacement	2,306,197		2,911,123	30,843,313	39,587,708	1,636,863		32,480,176	42,671,151
Export	114,686		154,638	940,142	724,709	123,205		1,063,347	811,335
Total	4,812,397	—14.29	5,614,564	62,147,967	78,343,539	3,563,023	—25.96	65,710,990	84,722,883
Production	5,505,601	—14.28	6,276,938	62,202,786	74,144,042	5,148,858	— 6.48	67,476,744	80,178,950
Inventory end of month	8,378,457	+12.14	7,471,450	8,378,457	6,962,771	10,115,742	+20.74	10,115,742	6,725,075

Note: Cumulative data on this report include adjustments made in prior months.
Source: The Rubber Manufacturers Association, Inc., New York, N. Y.

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PRODUCTION MANAGER—TECH. SUPT. NOW DOING CONsulting work, desires new connection. Broadest of practical experience manufacturing all types of mechanicals and molded sponge rubber products. Address Box No. 974, care of INDIA RUBBER WORLD.

CHEMIST-COMPOUNDER, B.S. IN CH.E., 1936. 14 YEARS' experience in compounding molded goods, belting, hose, packing. Thorough knowledge of basic factory operations. Able to head up lab. staff. Desire permanent position in well-established firm. Address Box No. 976, care of INDIA RUBBER WORLD.

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AN ESTABLISHED NEW ENGLAND CONCERN RECENTLY opened a precision molded goods department. We are looking for a man experienced in production techniques, with managerial ability, capable of growing with this department. Reply with complete résumé to Box No. 962, care of INDIA RUBBER WORLD.

WANTED: EXTRUSION EXPERT FOR POLYETHYLENE OR vinyl film. Old established firm contemplates extruding plastic film. Require top-grade man to set up complete plant from scratch and then take charge of production. Salary will be based upon experience and ability. Excellent opportunity for a capable individual. Address Box No. 964, care of INDIA RUBBER WORLD.

SITUATIONS OPEN (Continued)

RUBBER TECHNOLOGIST—CHEMIST OR CHEMICAL ENGIneer. Large Eastern supplier has opening for permanent position in its Rubber Laboratory for recent college graduate with up to five years' industrial experience in mechanical goods, sundries, wire, tires, or latex. Practical experience in factory processing and compounding essential so that laboratory results can be readily interpreted and demonstrated to customers. Position offers excellent opportunities for advancement in either sales or development compounding. Progressive management encourages publication of experimental work. This, coupled with laboratory having finest equipment and staffed with highest type of trained technicians, assures successful applicant of ample opportunity to demonstrate ingenuity and ability. Position also offers opportunity for some travel and for contacts with the rubber industry. Write, giving full details, age, education, and experience. Replies held strictly confidential. Our employes know of this ad. Address Box No. 963, care of INDIA RUBBER WORLD.

CABLE DESIGN ENGINEER
Electrical engineer experienced with specifications, design development, and production of insulated wire and cable. Write giving details on education, experience, and salary to Box No. 965, care of INDIA RUBBER WORLD.

GRADUATE CHEMIST. 3 OR MORE YEARS' EXPERIENCE IN the control and research of latex and latex compounds. Factory located in Rhode Island. Address Box No. 966, care of INDIA RUBBER WORLD.

WANTED: CHEMIST-COMPOUNDER BY MIDWEST MECHANical molded goods manufacturer of 40 years' standing. A job with a future for alert, progressive man. Salary, bonus, life ins., pd. vacation. A good opportunity. Replies confidential. Address Box No. 970, care of INDIA RUBBER WORLD.

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TEST ENGINEER
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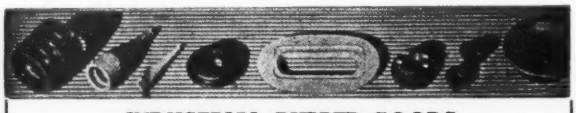
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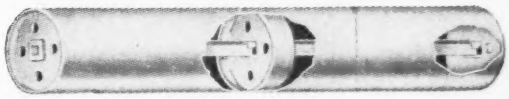

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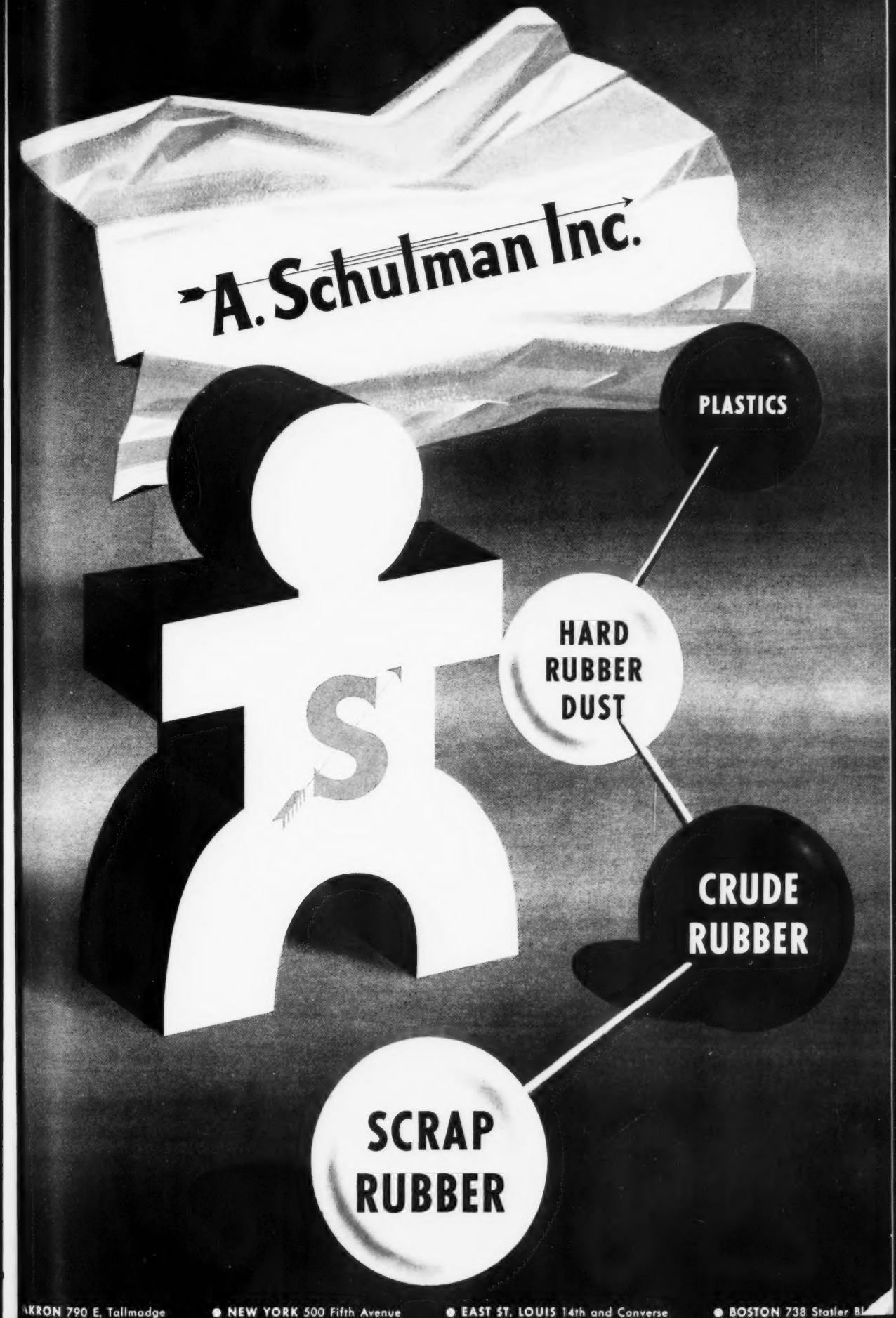
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